IMP. BUR.
16 MAY. 1914
COM.

August 3, 1894.

North Carolina

Agricultural Experiment Station,

Bulletin No. 102.

ENCOURAGEMENT TO THE DAIRY INTERESTS OF NORTH CAROLINA,

THROUGH THE MEDIUM OF THE STATE FAIRS.

Publications will be sent to any address in North Carolina upon application.

N. C. COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

THE NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION,

INCLUDING

THE FERTILIZER CONTROL STATION

AND THE STATE WEATHER SERVICE,

UNDER THE CONTROL OF THE

BOARD OF TRUSTEES OF THE A. AND M. COLLEGE.

W. S. PRIMROSE, *Chairman*, Raleigh.

W. F. GREEN ..... Franklinton.	W. E. STEVENS ..... Clinton.
D. A. TOMPKINS ..... Charlotte.	J. H. GILMER ..... Greensboro.
H. E. FRIES ..... Salem.	J. F. PAYNE ..... Alma.
N. B. BROUGHTON ..... Raleigh.	J. R. MCLELLAND ..... Mooresville.
W. R. WILLIAMS ..... Falkland.	R. W. WHARTON ..... Washington.
J. B. COFFIELD ..... Everett's.	T. B. TWITTY ..... Rutherfordton.
W. R. CAPEHART ..... Avoca.	

STATION COUNCIL.

A. Q. HOLLADAY, *Pres. A. and M. College.* W. S. PRIMROSE, H. B. BATTLE.

OFFICERS OF THE EXPERIMENT STATION.

H. B. BATTLE, PH. D	Director and State Chemist.
F. E. EMERY, M. S	Agriculturist.
GERALD MCCARTHY, B. SC	Botanist and Entomologist.
W. F. MASSEY, C. E	Horticulturist.
C. F. VON HERRMANN (U. S. Weather Bureau)	Meteorologist.
F. P. WILLIAMSON, D. V. S	Consulting Veterinarian.
B. W. KILGORE, M. S	Assistant Chemist.
F. B. CARPENTER, B. S	Assistant Chemist.
W. M. ALLEN	Assistant Chemist.
C. B. WILLIAMS, B. S	Assistant Chemist.
ALEXANDER RHODES	Assistant Horticulturist.
ROSCOE NUNN (U. S. Weather Bureau)	Assistant Meteorologist.
A. F. BOWEN	Secretary.

RALEIGH, N. C.

ENCOURAGEMENT TO THE DAIRY INTERESTS OF NORTH CAROLINA,

THROUGH THE MEDIUM OF THE STATE FAIRS.

By F. E. EMERY, Agriculturist.

It has seemed to us that the State Fair presents a good opportunity to study and encourage the dairy interest of the State. It is true North Carolina is not at present a dairy State. It is equally true she may and can be more of a dairy State than she is. With our interests nearly all centered in agricultural pursuits, it is a shame that dairy products, cattle foods and pork should be brought from without our borders.

Especially is this common practice most inadvisable when we consider the low state of fertility of farming lands generally, and that this is chiefly due to the neglect of live-stock interests and cropping the soil without regard for anything but the present crop.

Extensive cropping must give way to less extensive farming with stock husbandry and intensive methods. By this means, while it is not likely any very remarkable results will be achieved, enough has been done on farms of our acquaintance to show that the improvement by this course is sure and steady, and that a policy of this kind steadily adhered to will secure good crops and prosperity for those who practice it.

There are many who share this belief. Some believe it, or assent to it, but go on in the old way; others stand halting between two opinions and make no progress, while a few start out and blaze the way toward better things. It is to these pioneers that we are all indebted for the light which leads us on, and which promises so much for the future.

If progress is to be made with live stock it must be with one of two kinds of stock, whatever breed is used—the common neglected stock of the country, or that which some one else has improved or kept good. Two ways are open for improvement, *i. e.*, to feed well and to breed well. Some men can buy good stock to start with, while others less favorably situated must start with the best their means will afford, usually native or grade females, and feed them well. Then, by selecting sires better bred than their own stock, great improvements can be made. Having thus started, the way for further gains, to men of large or small means alike, lies in testing what they have with the best comparative means at hand, and to discard the progeny from *all but the best.*

In testing cows we hope to show many of our people one of the best, as it is the most advanced of, methods of testing the comparative, and also the intrinsic value, of cows.

The Babcock Test has become so well known as hardly to need explanation. It is a simple machine by which anyone who can learn to measure milk in a glass tube, who can weigh accurately, and who knows the multiplication table, can easily test milk and determine the amount of fat it contains, and from the fat calculate the amount of butter it will make. This determination of fat also indicates the value of the milk for food or cheese making.

The method of operating is to weigh the milk as soon as drawn from the cow and bring it to a uniform condition by pouring back and forth a few times gently from one vessel to another; measure out a given amount, and put with it an equal volume of commercial sulphuric acid. Then after whirling it in the machine and filling up with hot water it is easy to read the per cent. of fat in the neck of the bottle. Multiply the weight of milk given by the cow at each milking by the number denoting the per cent. of fat and divide by one hundred for the weight of butter fat. Divide the number denoting the butter fat by .85, and the quotient will be the amount of butter which the milk tested should yield. Thus it is but a simple matter, if care is taken, to make the tests with great accuracy.

I. TESTING DAIRY COWS AT THE STATE FAIR OF 1894.

The following is extracted from the premium list* of the State Fair of 1894, October 23—26, and outlines a plan by which the Station offers its coöperation in encouraging the dairy interest of North Carolina.

PREMIUMS FOR BEST DAIRY COWS.

(WITH THE COÖPERATION OF THE N. C. AGRICULTURAL EXPERIMENT STATION.)

OPEN TO ALL BREEDS OWNED IN NORTH CAROLINA.

$40 TO FIRST. $25 TO SECOND. $10 TO THIRD.

It is well known that cows capable of the largest yields of milk, butter and cheese are so highly organized that any undue or unusual movements excite them, diminish their yields of milk and reduce the quality of what they do yield. Hence, the quiet of their usual home surroundings is the best place to make these tests, which shall be made known and the prizes awarded when the cows are placed on exhibition at the Fair. The tests shall be conducted at some time during the month of September by some member of the staff of the North Carolina Experiment Station commissioned to make them.

CONDITIONS OF THE TESTS.

The cows tested must be entered on the regular books of the State Agricultural Society as members of herds competing for herd prizes, or for best cows in their respective classes at the State Fair, and they must be there exhibited or no prize will be awarded even if otherwise deserved.

The prizes will be awarded to the cows which score the highest number of points and which appear on the Fair Grounds in the respective exhibits of their owners, according to the order of the scores earned by the cows.

The highest number of points earned secures the first prize of $40.

The second highest number of points earned secures the second prize of $25.

The third highest number of points earned secures the third prize of $10.

In order to have this test conducted, an owner of cows should enter his herd or individual cows with the Secretary of the Fair for the regular herd or individual prizes, then request a test and name a date in September on which he would like to have the test made. If other dates do not interfere, that will be the date for the test if the Station representative can reach the place in season, otherwise another date will be arranged convenient to both parties. When the date is agreed upon, a deposit of $10 by each person so entering his cows must be made with the Director of the Experiment Station, as a forfeit to partly defray the expenses of the test if the cow is not regularly exhibited. This money is to be returned by the Director whenever satisfactory evidence is given that the tested cow has been placed on exhibition at the Fair.

RULES FOR CONDUCTING THE TEST.

The owner of a cow to be tested shall file a certified statement with the Station representative before the test begins; stating—

*The complete premium list of the State Fair for 1894 can be secured without charge by application to the Secretary, H. W. Ayer, Raleigh, N. C.

1st. The breed; number, if registered, and age of cow in years.

2d. The number of calves she has produced; date of last calving; date of last bull service and when expected to come in milk again; or if not bred, so state.

3d. The separate kinds and amounts of food eaten by the cow in the last ten days before the date of test, and the value of each per ton in dollars. If quality and quantity of food was changed in that time, state how much, and why.

4th. The Station representative will carefully weigh and record the food of each cow tested for the 24 hours of the test, beginning with the evening previous to the day of the test, and he will also inspect the pail and weigh the milk for the last milking before the test begins.

5th. The Station representative shall not interfere with the usual hours of feeding and milking cows except to see that 24 full hours, and no more, are allowed for secretion of milk, and to assure himself of the weight of all the food given the cow under test. He should weigh or measure the water drank, if convenient, without disturbing the cow undergoing the test.

6th. He will weigh and inspect the milk pail before each milking on the day of the test, and weigh and take so much of the milk as will insure an ample amount for specific gravity and fat determinations.

7th. He will proceed with the tests without delay, and may present the owner of each tested cow a copy of what he finds, upon the owner's faithful promise not to divulge the result to anyone until after the coming State Fair; but the representative shall impart such information to no other person except the Director of the Experiment Station, who will keep the tests secret until after the public announcement has been made at the State Fair.

8th. The Quevenne Lactometer for specific gravity and Babcock Tester for the per cent. of fat shall be used to determine the valuable constituents of the milk.

9th. Each cow will be credited with as many points as her product periods of lactation and gestation can reach on the following scale:

For every 20 days lactation	1 point.
For every ten days gestation	1 point.
For every two onces of solids, not fat, yielded in 24 hours	1 point.
For every ounce of butter fat yielded in 24 hours	2½ points.

If Breeders' Associations, or individual owners of pure bred cattle wish to offer similar prizes for their respective breeds, they will be accepted and the tests made under the above terms for all such entries of cows owned in North Carolina as may be exhibited at the State Fair.

Records of Tests.

There will be three forms that will be used in connection with the tests: 1st. Breeder's Form, No. 1, giving the application of the owner of the cow for admission into the contest, with certain information in regard to his stock. 2d. Breeder's Form, No. 2, showing food consumed per day for ten days previous to the test. 3d. Tester's Form, giving the record of tests and the result of marks as per conditions already set forth.

APPLICATION FOR COWS TO BE TESTED FOR PREMIUM AT STATE FAIR, 1894

I HEREBY CERTIFY THAT THE INFORMATION GIVEN BELOW IS CORRECT IN ALL RESPECTS.

BREEDER'S FORM, No. 1. ----------, OWNER.

NAME OF COW AND REGISTERED NUMBER.	Breed of Cow.	Age of Cow (Years).	Date of Last Calving.	Number of Calves Produced.	Has Cow been Bred Since Last Calving?	Date of Last Service.	OWNER AND POST-OFFICE ADDRESS, WITH NAME OF FARM.

FOOD CONSUMED PER DAY BY COWS FOR TEST DURING 10 DAYS PREVIOUS TO TEST. (*If any change on or before date of test, indicate it under Remarks.*)

I HEREBY CERTIFY THAT THE INFORMATION GIVEN BELOW IS CORRECT IN ALL RESPECTS.

BREEDER'S FORM, No. 2. ----------, OWNER.

KINDS OF FOOD EATEN.	Pounds Fed of Each Article.	Pounds Refused by Cow.	Pounds Food Consumed.	REMARKS ON CONDITION OF FOOD OR COW.

RESULT OF TESTS.

THE FOLLOWING RECORD OF TESTS OF THE COWS NAMED WAS MADE BY ME AT ---------- ON ----------, 189--, AND IS HEREBY CERTIFIED TO BE CORRECT IN ALL RESPECTS.

TESTER'S FORM. ----------, TESTER.

NAME OF COW TESTED		Yield of Milk in 12 Hours.	Specific Gravity (Quevenne).	Per Cent. of Fat (Babcock Test).	Ounces of Solids not Fat.	Ounces of Fat.	Points Allowed on Lactation.	Points Allowed on Gestation.	Points Allowed on Total Solids.	Points Allowed on Fat.	Total Points Allowed.
	a. m.										
	p. m.										
	a. m.										
	p. m.										

II. TESTING DAIRY COWS AT THE STATE FAIR OF 1893.

In order to create interest in the need of accurate tests of dairy stock in determining their value, the work described below was done. The following circular was distributed to the owners of the cows on exhibition at the State Fair grounds in 1893:

TEST OF COWS AT THE FAIR.

The value of every cow to her owner is measured by the income she is able to bring in calves, milk, butter, or cheese. In all cases where there is only a limited market for milk, the most profit may be realized from the manufacture and sale of butter, including the by-products, skim milk and buttermilk. Hence the amount of butter fat and quantity of butter which may be made from a cow has been shown to be a fair test of the cow's capacity to return profit or not.

Cows of equal merit, so far as any external differences may and have been shown to exist, differ very widely in the return they make for a given amount of food and care.

It is proposed to give exhibitors a free test for one day of the Fair of every cow presented in competition for the prizes offered by the Society. This will show the breeder something of the real relative merit of his stock independent of external points, and will also serve to show the simplicity of the accurate tests by which each may continue at home to discriminate between members of his herd; to weed out the least profitable, and to raise calves only from those cows which show themselves worthy to breed from.

The data the young men, students at the North Carolina College of Agriculture and Mechanic Arts (under the direction of the Agriculturist of the Experiment Station) will need in order to make these tests of the greatest comparative value, is enumerated below:

(1) Name and address of owner.
(2) Breed of cow.
(3) Name and registered number of cow if eligible to registry.
(4) Kinds and amount of food used per day.
(5) Weight of milk given at each milking.

In order to make the test complete, the man in charge of the test must see the cow milked out the night before the test begins, and be present at each milking to weigh the pail before the cow is milked and the milk afterwards, when he will take the sample for the test.

Scales and sample pails will be provided by the Experiment Station and the data collected will be turned over to the Agriculturist of the Station for discrimination. Each owner of a cow tested will be furnished with a copy of the report of the test, either in manuscript or printed, at the earliest opportunity.

For these tests two members of the senior class of the A. and M. College were put in charge of the work of taking the samples and making the tests. No notice was given of a desire to test cows previous to their appearance on the Fair grounds; therefore no preparation could have been made for it, and in fact the cows had been fed on the regular home rations, as given below.

Ten cows were secured for trial. Messrs. Patterson and Walton of the A. and M. College were on hand, and saw the cows milked on the evening of the second day of the Fair, and on the third day took samples morning and evening, and made the tests in connection

with the Experiment Station Exhibit, where visitors could see the whole operation.

The cows were not milked with the usual regularity, it being late when the attendants began in the morning and early for milking in the evening, but the last milking was very nearly 24 hours from the milking on the preceding day, so it was very nearly a 24 hours test for each cow. The yields and percentages of fat are subject to some fluctuation by variations from the ordinary treatment, such as moving to the Fair, and constant passing of strangers; hence we should not consider these results as equal to the every-day yields at home of the cows submitted to trial.

The cows entering into this test were one Ayrshire and one Holstein-Friesian, which Mr. J. B. Burwell, Raleigh, N. C., exhibited in their respective classes.

Two Guernseys from Dr. R. H. Lewis's Cloverdale Farm, entered in the Guernsey list by Messrs. Bradshaw & Tyson, who also entered a cross-bred cow, three-fourths Jersey and one-fourth Guernsey, and one native belonging to Mr. Tyson.

There were four registered American Jersey Cattle Club cows from the herds of Maj. R. S. Tucker, Raleigh, N. C., and Col. J. S. Carr, Hillsboro, N. C.

The feed of the cows before and at the Fair was as follows:

Ayrshire and Holstein-Friesian.—These were grazed and fed on silage once daily, with a small grain ration, consisting of cotton-seed meal and wheat bran, mixed in the proportions of 2 to 1, and stock beets (mangolds) once a week, making in all, as much as the cows would eat.

Guernseys.—Corn silage *ad libitum* twice daily, with a grain ration of wheat bran and cotton-seed meal in proportions of 1 to 2. Fed at Fair same as at home on silage and grain.

Cross-bred and native cows same as Guernseys.

Jerseys—Major Tucker's cows were fed chops with wheat bran half and half, with crab grass hay all they would eat.

Colonel Carr's cows were fed pulled corn fodder, orchard grass, and other hays, oats, wheat bran and cotton-seed meal. Proportions were not ascertained.

The amount of food for all the cows was rather indefinitely stated. owing to not being accustomed to measure or weigh feed accurately,

The following table shows the data collected:

TABLE II.—RESULT OF DAIRY TEST AT STATE FAIR OF 1893.

Time. Oct. 19, '93.	Name and address of Owner.	Age of Cow (Years.)	Breed of Cow.	Date of last Calving.	Name and Registered Number of Cow.	Weight of Milk. Pounds.	Per cent. fat in milk.	Pounds fat in Milk.	Equivalent in pounds Butter at 85 per cent. Fat.
Morning	Jno. B. Burwell, Raleigh, N. C.	9	Ayrshire	May, 1893	Carrie Bell (9435)	7.59	4.20	.319	.63
Evening						4.00	5 40	.216	
Morning	Jno. B. Burwell, Raleigh, N. C.	5	Holstein-Friesian.	June, 1893	Princess of Wake (17505)	13.125	3.60	.472	.108
Evening						9.31	4.80	.447	
Morning	R. H. Lewis, Raleigh, N. C.	10	Guernsey	July, 1893	Queen (1654)	3.81	7.00	.267	.623
Evening						3 56	7.40	.263	
Morning	R. H. Lewis, Raleigh, N. C.	5	Guernsey	April, 1893	Edgarda (559)	2.00	4.50	.090	.324
Evening						3.00	6.20	.186	
Morning	R. H. Lewis, Raleigh, N. C.	11	Cross-bred: ¾ Jersey, ¼ Guernsey	Oct. 7, 1893	Edith	19.81	3.20	.634	1.238
Evening						11.625	3.60	.418	
Morning	Mr. Tyson, Raleigh, N. C.	9	Native	Sept., 1893	White Head	5 187	*1.40	.0726	.191
Evening						3.00	3.00	.0900	
Morning	R. S. Tucker, Raleigh, N. C.	7⅞	Jersey	July, 1893	Speed of Gaston (43079)	8.00	5.60	.448	.777
Evening						4.30	6.80	.2124	
Morn., 20th. Even., 19th.	R. S. Tucker, Raleigh, N. C.	7⅞	Jersey	Oct. 16, 1893	Rhoda St. Helen (39077)	8.40	4.20	.3528	.557
						4.30	**2.80	.1204	
Morn., 19th. Even., 19th.	J. S. Carr, Hillsboro, N. C.	3½	Jersey	March, 1893	Moon Flower (55922)	1.05	6.30	.066	.146
						.90	6.40	.058	
Morning	J. S. Carr, Hillsboro, N. C.	6	Jersey	March, 1893	Romola (47860)	***5.00+	8.40	.42+	1.129+
Evening						6.75	8.00	.54	

** Rhoda St. Helen had a young calf by her side and mental excitement reduced the per cent. of fat. This was the first milking after the calf was removed, and her flow of milk had not become established. Morning of the 19th calf taken away and morning's milk of 20th taken for test.

*** Romola being milked by unfamiliar hands resented and kicked over part of the morning milk, hence the plus sign attached to yields from her. * Morning test from White Head repeated next day with the same results.

When the first tests were made and the milk from White Head gave so low a percentage of fat, it was repeated again next day. The second test coincided with the first, and she might be called a skim-milk cow. Since the Fair, when their attention was called to this, Messrs. Tyson & Bradshaw informed us this cow was "off feed" that day, and hence not in normal condition. Her heifer calves by a Guernsey sire will doubtless show great improvement.

In case of a few of these cows, the yield has fallen so low as to point them out as poor specimens for milkers. Edgarda and Moon Flower are the most striking examples. Unless there is some good reason for this small yield, like having been bred again immediately, or sickness, they would appear to be but poor specimens of their respective breeds.

Edith, the cross-bred cow, fresh in milk, and at height of flow, leads in yield, while Romola, calved in March, and Princess of Wake in June, with over a pound of butter per day each, have a good claim to superiority. Rhoda St. Helen, with a two days' old calf, gave us what we might expect from her milk not having changed to its normal condition at the first trial. It was evidently a sample of colostrum which was tested. Neither the yield nor per cent. of fat were up to the normal for this cow at the time of the test.

RECENT BULLETINS OF THE EXPERIMENT STATION.

Bulletins will be sent to addresses in North Carolina free of charge. To parties outside of the State a small fee of 6 cents each (10 cents each for Nos. 73 and 92) is charged, or 25 cents per year. Only a limited number can be sent to each address, and the Station therefore must request parties to confine their applications to actual needs. Apply to Dr. H. B. Battle, Director, Raleigh, N. C.

No. 70. Weed Pests of the Farm; Japan Clover, plates 11, pp. 28.
No. 71. Co-operative Field Tests during 1889; Hill-side Ditches, Fig 1, pp. 32.
No. 72. Work in Horticulture; Pea-vine Manuring, pp. 16.
No. 73. The Best Agricultural Grasses, plates 74, pp. 100.
No. 74. Tests of Garden Vegetables; The Culture of Figs, plates 2, pp. 20.
No. 75. Fertilizer Analyses; Season of 1891, pp. 16.
No. 76. Plant Diseases and How to Combat Them, plates 13, pp. 20.
No. 77. Value of Pea-vine Manuring for Wheat, plate 1, pp. 8.
No. 78. Some Injurious Insects, plates 37, pp. 32.
No. 79. Facts for Farmers in Plain Language for Farmers' Reading, pp. 24.
No. 80. Silos and Ensilage, pp. 17.
No. 81. Feeding Cotton-seed Hulls and Meal for the Production of Beef, pp. 28.
No. 82. Fertilizer Analyses and the Fertilizer Control for 1891, pp. 20.
No. 83. Growing Celery in the South; Cultivation of Onions; Notes of Horticultural Work During 1891, Figs. 2, pp. 20.
No. 84. Some Enemies of Truck and Garden Crops, Figs. 32, pp. 26.
No. 85. The Late Crop of Irish Potatoes in the South, pp. 10.
No. 86. Tobacco Curing by the Leaf; Cure on Wire and the Stalk Processes, pp. 32.
No. 87. All Publications of the Station, from March, 1877, to September, 1892, pp. 20.
No. 88. Fertilizer Analyses, and The Fertilizer Control During 1892, pp. 24.
No. 89. Co-operative Field Tests During 1891 and 1892, pp. 48.
No. 90. Practical Stock Feeding, pp. 32.
No. 91. Some Experiments in Wheat Culture, pp. 20.
No. 92. The Culture of Orchard and Garden Fruit, Figs. 91, pp. 148.
No. 93. Feeding Experiments, pp. 48.
No. 94. Horticultural Tests and Results with Vegetables, Fruits and Bulb Culture, pp. 20.
No. 95. The Fertilizer Control During 1893, pp. 32.
No. 96. Miscellaneous Agricultural Topics, Figs. 19, pp. 32.
No. 97. Digestion Experiments, Fig. 1, pp. 48.
No. 98. Some Leguminous Crops and their Economic Value, Figs. 9, pp. 40.
No. 99. Thread Worm of Pork (Trichina Spiralis), Figs. 9, pp. 8.
No. 100. Our Common Insects, Figs. 65, pp. 36.

August 17, 1894.

North Carolina

Agricultural Experiment Station,

Bulletin No. 103.

MISCELLANEOUS AGRICULTURAL TOPICS

CONTAINED IN

THE PRESS SERVICE BULLETINS OF JANUARY TO JUNE, 1894.

Publications will be sent to any address in North Carolina upon application.

N. C. COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

THE NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

INCLUDING

THE FERTILIZER CONTROL STATION

AND THE STATE WEATHER SERVICE,

UNDER THE CONTROL OF THE

BOARD OF TRUSTEES OF THE A. AND M. COLLEGE.

W. S. PRIMROSE, *Chairman*, Raleigh.

W. F. GREEN.....Franklinton.	W. E. STEVENS .....Clinton.
D. A. TOMPKINS .....Charlotte.	J. H. GILMER..... .....Greensboro.
H. E. FRIES.....Salem.	J. F. PAYNE ....Alma.
N. B. BROUGHTON .....Raleigh.	J. R. MCLELLAND .....Mooresville.
W. R. WILLIAMS.....Falkland.	R. W. WHARTON .....Washington.
J. B. COFFIELD.....Everett's.	T. B. TWITTY .....Rutherfordton.
W. R. CAPEHART .....Avoca.	

STATION COUNCIL.

A. Q. HOLLADAY, *Pres. A. and M. College.* W. S. PRIMROSE, H. B. BATTLE.

OFFICERS OF THE EXPERIMENT STATION.

H. B. BATTLE, PH. D. .....Director and State Chemist.
F. E. EMERY, M. S.....Agriculturist.
GERALD MCCARTHY, B. SC.....Botanist and Entomologist.
W. F. MASSEY, C. E.....Horticulturist.
C. F. VON HERRMANN (U. S. Weather Bureau)..... .....Meteorologist.
F. P. WILLIAMSON, D. V. S.....Consulting Veterinarian.
B. W. KILGORE, M. S.....Assistant Chemist.
F. B. CARPENTER, B. S. .....Assistant Chemist.
W. M. ALLEN.....Assistant Chemist.
C. B. WILLIAMS, B. S. .....Assistant Chemist.
ALEXANDER RHODES.....Assistant Horticulturist.
ROSCOE NUNN (U. S. Weather Bureau) .....Assistant Meteorologist.
A. F. BOWEN .....Secretary.

RALEIGH, N. C.

PREFACE.

As has been stated previously, the press bulletins of the Station were inaugurated to present a condensed summary of the work of the Station in the columns of the local newspapers and agricultural journals. The plan first put in operation, on May 24, 1890, has continued to meet with favor. The press service plan for distributing these articles by means of plates, first commenced on June 8, 1894, has proven so acceptable that they have been reprinted in the form of regular bulletins. The regular bulletin, No. 96, contained these articles for the seven months previous. The present bulletin contains the instalments that appeared from January to June, 1894, inclusive.

The following is extracted from the preface of bulletin No. 96, and applies with additional force since that bulletin was issued: "Such have been the calls for information contained in these press service bulletins, that it has been determined to reprint, in the following bulletin, the seven monthly instalments published from June to December, 1893, inclusive. Such also have been the repeated endorsements of the plan of sending out this information, that the Station does not fear adverse criticism (if there be any) questioning whether such work legitimately comes under the scope of agricultural research and experimentation. If there should be any critics disposed to doubt the advisability of it, their attention is drawn to the *first* sentence of the well-known Hatch Act":

"That in order to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture," etc.

H. B. Battle, *Director.*

THE EXPERIMENT STATION

At Raleigh, N. C., Presents Matters of Interest to Agriculturists.

Its Publications Are Free to Those in North Carolina Who Really Desire to Read Them.

JANUARY 27, 1894.

No Distribution of Plants, Seeds, &c.

The Experiment Station has no supply of seeds, plants, &c., for general distribution, and correspondents should remember this fact and not write for them. It does not attempt to keep a supply on hand for the reason that it is not in the province of its work to distribute common seeds, and besides there are nurserymen and seedsmen who make it their business to keep these stocks and can fill your orders. Occasionally the Station distributes one or two varieties of new seeds or plants, when they are promising, but unless you see a distinct announcement of this fact, please do not make application to the Station.

The Experiment Station Bulletins.

The standing offer is made to send the bulletins of the Station to all in the State who really desire to receive them. Thousands of farmers have already taken advantage of this offer. Unless you really want to be benefited by them, please do not apply for them. If you desire to read them, write on postal card to Dr. H. B. Battle, Director, Raleigh, N. C.

Formulas for Composts and Home-made Mixtures for Cotton and Corn.

1. Stable manure,	600 lbs.
Kainit,	200 "
Acid phosphate,	800 "
Cotton seed,	400 "
	2,000 lbs.
2. Kainit,	200 lbs.
Acid phosphate,	600 "
Stable manure,	600 "
Cotton seed meal or fish scraps,	600 "
	2,000 lbs.
3. Kainit or ashes,	200 lbs.
Acid phosphate or bone meal,	800 "
Stable manure with yard scrapings and leaves,	1,000 "
	2,000 lbs.
4. Acid phosphate or bone meal,	600 lbs.
Ashes,	200 "
Stable manure,	600 "
Rich earth or yard scrapings,	600 "
	2,000 lbs.

These are given as suggestions. Individual requirements may need somewhat different proportions with a change of ingredients at hand. Composts should be laid down under shelter if possible, and on stiff clay foundation and level so that no leachings may run off. About six weeks before ready to use, put down a layer of stable manure three or four inches thick, then a thinner layer of cotton seed (if this is used) then a layer of acid phosphate, and finally a layer of kainit. Each layer should be thoroughly wet after it is put down. Repeat layers until heap is built up three or four feet. Then cover with a layer of dirt to protect it and prevent leaching from rain. Examine from time to time and wet the heap if there is undue heating. At the time for hauling to the field, the heap should be cut down from top to bottom and mixed thoroughly as possible. When ashes are used it is best not to allow them to come in contact with the stable manure, as there might be some tendency to decompose it.

A dry mixture about equal to the ordinary complete ammoniated fertilizer would be:

Acid phosphate,	1,200 lbs.
Kainit,	200 "
Cotton seed meal,	600 "
	2,000 lbs.

These can be easily mixed at any time before using; a large, tight box or wagon-body is very suitable. Have two men stand on opposite sides and mix with hoes. If materials are dry, they can be easily and thoroughly mixed at a nominal cost. Do not expose to weather before use.—H. B. BATTLE, Director N. C. Experiment Station.

Soy (Soja) Beans Ought to be Planted.

A correspondent writes: "When is the right time to sow (or plant) soy beans? What kind of soil and how should it be prepared for same? How do they compare with black peas as a feed and land improver? By giving this information you will greatly oblige."

Soy beans should not be sown broadcast, but planted in hills or drills 2½ or 3½ feet apart according to richness of soil. If in hills, 15 to 24 inches is far enough apart in the row. They will doubtless grow on any soil that corn will grow on, and may be planted at the same time as corn, which gives a long season from March to July. It is a good plan to plant in the corn rows between the hills or stalks of corn. If corn is grown for silage, the beans can be cut with the corn and will add greatly to its value. The upright growth of soy beans leaves room for cultivation, and this should be accorded to check the growth of weeds.

As food for stock, the soy bean is one of the richest legumes that can be grown. In chemical composition the dry matter of soy-bean-silage and Black peavine hay differ more in fat and other carbohydrates than protein. The roots of soy beans bear numerous tubercles, which aid it by gathering nitrogen from the air the same as those of the peavine or clover roots. There is no spreading by running vines to shade the ground, which is one of the potent factors in soil improvement, hence soy beans must be planted near enough for shade. On poor soil, there should be one plant every 2x1 feet and from that up to 2x3½ feet. It is usual to plant 2 to 4 beans in a hill, as it makes the stems finer, and they are hard and woody at best. They are well suited to grow in any part of this state and can be depended on for good crops of seed. To save the seed the stalks should be pulled or cut and stacked up loosely as soon as leaves and pods have changed from green to a golden hue, and when dry threshed out. The pods should not be hand-picked, because there are too many and with only one to three beans in a pod it will not pay. They will beat out very easily when ripe and dry, as he who leaves them too long will learn to his cost, for the pods will open and the peas scatter upon the ground. This is a most desirable plant to raise for stock. It is also a good table bean, but requires a long time in cooking, and most people will have to learn to like its flavor.—F. E. Emery, Agriculturist N. C. Experiment Station.

Lathyrus Sylvestris or Flat Pea.

The so-called Flat pea, Lathyrus Sylvestris, is closely related to the Vetches, but is a perennial. The other species of Lathyrus are commonly called vetchlings and have little agricultural value. All contain a poisonous alkaloid, but the introducer of the Flat pea claims to have improved or bred out the poisonous principle. The most extravagant claims have been made for this plant by its introducer. The improved plant originated in Germany.

In the spring of 1890 a small package of Lathyrus seed was received at this station from the English disseminator, about three-fourths of the package was soon on a trial plot adjoining similar plots of Lucerne, Spotted Medic and various clovers. The soil was a gravelly red clay naturally well drained and was enriched by a heavy dose of a complete commercial fertilizer. At the end of one month only a few very feeble Lathyrus plants were alive, and these were soon smothered by wild grasses and disappeared wholly. During the same time the neighboring plots of Lucerne, etc., grew finely.

The remaining Lathyrus seed was then sown in a box and kept on a shaded porch. At the end of six months about fifteen plants from one to two inches high were alive. In the fall these were transplanted to a row in the pear orchard on the Experiment Farm. The soil was a well enriched loam. All these plants were alive the next spring, but during the whole season grew only a few inches. Weeds and grasses were carefully removed by hand every two or three weeks. The next spring eleven of the plants were removed from the orchard and set in a single row on a rich and mellow terraced hillside, where they have remained since. The plants so far have not flowered, and of course no seed has been formed. The plants grow flat on the ground, too low to be mowed, and as new leaves grow at end of stem the older ones behind rot. From its behavior with us Lathyrus Sylvestris promises no practical value as on account of the low vitality of the seed and the extreme slowness of growth of the plant. On good or average soil it is certain to be overpowered and smothered by Crab and Bermuda grasses and weeds.

If this plant posseses any economic value it will be for the sand-hill region, where wild grasses and weeds are less intrusive. We cannot advise anyone to invest largely in this plant at present. The seed now costs $4.00 per pound and is advertised by most seedsmen.—Gerald McCarthy, N. C. Experiment Station.

Advanced Meteorological Summary for North Carolina, December, 1893.

The N. C. State Weather Service issues the following advanced summary of the weather for December, 1893, as compared with the corresponding month of previous years:

Temperature.—The mean for the month was 44.1 degrees, which is 1.4 above the normal. The highest monthly mean was 51.1 at Wilmington; lowest.

37.2, at Blowing Rock. Highest temperature, 76 on the 1st at Washington, on the 3rd at Tarboro; lowest, 10 on the 5th at Bakersville. The warmest December during the past twenty-two years was in 1889—mean, 52.9; coldest December during past twenty-two years in 1876—mean 34.2.

PRECIPITATION.—Average for the month, 3.15 inches; this is 0.85 inch below the normal. The greatest amount was 5.88 at Washington; least amount, 0.79 at Mocksville. The wettest December in twenty-two years occurred in 1884—average, 6.77; the dryest, in 1889—average, 0.59 inch. There was only one day (the 5th) with snow of any considerable amount; greatest total snowfall reported was 7.00 inches, at Henderson. Unusually heavy sleet occurred on the 5th in the vicinity of Goldsboro and Falkland.

WIND.—Prevailing direction, southwest. The normal direction is northeast. Average hourly velocity, 9.1 miles. Highest velocity, 60 miles per hour at Kitty Hawk on 5th.

MISCELLANEOUS.—Thunderstorms were reported on the 3rd at quite a number of places in the eastern and central part of the State; at three stations on 16th. Sleet or hail on 2d, 3rd, 4th, 5th, 14th. Snow on 4th, 5th, 17th. 18th, 31st. Halos on 15th, 20th, 22d, 24th. Meteors were observed on the 11th, 20th and 28th. On the morning of the 20th an unnsually large, bright one was observed in the east.

Cold Waves.

Cold waves are those sudden changes from high to very low temperature which constitute the most noteworthy feature of winter weather in the United States. They are produced by the flow of masses of cold, dry air from the regions east of the Rocky Mountains in British America, towards the south or southeast. During the long winter nights of the Arctic regions dry, clear, air accumulates in deep layers which is cooled by radiation to a temperature many degrees below zero; and then commences to flow towards any place where warm air is ascending, as it does in the low pressure areas or storms which constantly pass from west to east across the United States.

A "low area" is produced by the air, somewhere becoming heated from unknown causes, above the surrounding atmosphere. This excessively heated air ascends and air is drawn in below from all sides to replace it. That drawn in on the south to east side is warm and moist; that drawn from the north to west side is dry and cold. The cold wave follows after the low area as it moves eastward. The severer and prolonged cold waves are associated with extensive areas of high pressure. Their rate of progress averages eight hundred miles in twenty-four hours.

It is of great advantage to many business and agricultural interests to know in advance when the temperature will fall quickly and decidedly, besides affecting the comfort and health of thousands of people.—C. F. VON HERRMANN, Meteorologist, N.C. Experiment Station.

Analyses of Fertilizers.

The North Carolina Experiment Station will issue in a few days complete analyses of samples taken during the spring and fall season of 1893. This will give the standing of the various fertilizers on sale during 1893, together with the comparative value of the unmixed ingredients at the seaboard. Tables of freight rates on the railroads will be given so that charges to nearly all interior towns can easily be seen. This bulletin list will be sent to all names on the station publication list.

During the spring season of 1894, analyses will be promptly made as soon as samples can be taken by the official inspectors. These analyses will be printed every two weeks, but will only be sent to those who specially apply for them. One application only is necessary for the whole series of bi-weekly editions. Those who are interested in these fertilizer analyses are advised to make application on postal card to Dr. H. B. Battle, Director, Raleigh. N. C,

QUESTIONS AND REPLIES.

The Station will be glad to receive questions on agricultural topics from any one in North Carolina who may desire to ask for information. Address all questions to the "N. C. Agricultural Experiment Station, Raleigh, N. C." Replies will be written as early as possible by the member of the Station staff most competent to do so, and, when of general interest, they will also appear in these columns. The Station expects, in this way, to enlarge its sphere of usefulness and render immediate assistance to practical farmers.

Note.

In a recent press article, in referring to saltpetre as a fertilizer, the writer had in mind Chili saltpetre, or nitrate soda. There is another saltpetre, the nitrate of potash, which of course contains potash in addition to nitrogen. As was stated, saltpetre is not a complete fertilizer, and other ingredients must be added to it. This is so with either form, but in the case of nitrate of potash only acid phosphate or some form of phosphate is needed to make it a compiete application. The Chili saltpetre (nitrate soda) was meant because it is the only saltpetre that here is used agriculturally.—H. B. BATTLE.

Satsuma Orange Trees.

Will you please furnish me with information about the Satsuma orange trees at your station?—M. W. C., Tallahassee, Fla.

(Answered by W. F. Massey, Horticulturist N. C. Experiment Station.)

The Satsuma orange trees are dead. The cold of last winter finished the last of them. They will stand a cold of 18° to 20°, but lower than this hurts and finally kills them. On our southern coast, I believe they will do well. They will stand our ordinary winter, particularly as they grow older, but a winter like that of 1892-93 will always destroy them.

Keeping Nitrate of Soda.

Please let me know how I can keep over, from one season to another, a lot of nitrate of soda without loss. I have tried keeping it in boxes, but the box, floor and everything near, becomes saturated with air-dissolved nitrate. I am trying this winter to keep it in kerosene oil barrels, and up to this time there is no sign of losing. I cover the top with about three inches of dry packed earth.—R. P. M., Saxon, N. C.

(Answered by H. B. Battle, Director, N. C. Experiment Station.)

The reason that Nitrate of Soda absorbs moisture is the same as that given for Kainit in the newspaper article which you noticed. If therefore the Nitrate of Soda can be put in a box or barrel so that the air can not well get to it, it can not absorb moisture and become wet and lumpy. The plan that you suggest of placing it in oil barrels and covering with dry packed earth is a good one.

The loss resulting from absorption of water and leaking would depend entirely upon conditions of the atmosphere, exposure, and causes similar.

Clover and Grass for Loamy Land—Peanuts—Chufas.

What are the best clover and grasses for light loamy land? Are peanuts or chufas better for turning hogs on in the fall?

(Answered by F. E. Emery, Agriculturist, N. C. Experiment Station.)

You will find orchard grass the hardiest and most vigorous grass you can use for hay. To thicken the stand and improve the hay, Kentucky blue grass is a favorite, while common red clover flowers near the time of both grasses. These make prime hay, and will grow well if treated to an occasional coat of stable manure. You will hardly make grasses profitable without this manuring. Probably you could get much more clean cash out of annual clover grown for seed. It should be sown in August or any time in the fall when there is likely to be moisture enough to give the little plants a fair start, so that early winter frosts will not pull them out of the ground. This clover will ripen in May. You can feed the straw, and the seed should sell for $5 or $6 per bushel.

Our experience with chufas is that there has been too small a yield to compare with peanuts, though we have not turned hogs on them. Some of our farmer friends have had experience with them, and have been beaten by neighbors growing peanuts. They will hereafter grow only peanuts for hogs.

The Cultivation of Onions and Irish Potatoes.

I have plowed in fifty lgads of good stable manure on two acres of land which I want to plant in onions. Will it require more manure? Please give best time and method of cultivation; also, whether to plant seed or sets. What is the best way to grow and cultivate Irish potatoes? Is commercial fertilizers as good as stable manure?—R. P. R., Newton, N. C.

(Answered by W. F. Massey, Horticulturist, N. C. Experiment Station.)

It is hard to grow a first-class crop of onions on land that has not been cultivated in vegetables and heavily manured for some years before. You do not say anything about the previous quality of your land, nor what kind of loads of manure you applied, nor the quality of the manure. Manure from highly fed animals and not of too strong a character is a very different article from ordinary yard manure. Fifty ordinary loads of ordinary manure on ordinary farm land will not grow a fine crop of onions—particularly if the land is of a clayey character. You cannot make land too rich for onions. On the land you name we would advise the addition of not less than 700 to 1,000 pounds of a complete commercial fertilizer, such as is made for tobacco growing, in the furrow under the onion rows. If you intend to grow ripe onions you should always sow the seed in February, as you can thus raise better onions than you can from sets. To raise early grown onions it is best to plant sets of the White Pearl onion in October. Seed would do just as well for these if sown in September, but the uncertainty of our fall weather and liability of dry weather at this time renders the germination of the seeds at this time rather uncertain. We therefore advise sets for fall planting. For spring sowing use seeds of the Prize Taker (a large yellow onion), White Globe, Southport, Pearl or Giant Rocco (brown.) The White Globe is the best keeper.

Plant early Irish potatoes in February, with 1,000 pounds of complete fertilizer per acre, well worked in the furrow and cultivate thoroughly. Commercial fertilizer is better than manure for Irish potatoes, as they grow smoother and are less liable to scab. If the land has been in clover or peas the previous year, the crop will be much better.

THE EXPERIMENT STATION

At Raleigh, N. C., Desires to Assist the Farmers of North Carolina

By Sending Its Publications to Those Who Really Desire Them or by Advices as to Agricultural Subjects.

MARCH 29, 1894.

The Experiment Station Bulletins.

The standing offer is made to send the bulletins of the Station to all in the State who really desire to receive them. Thousands of farmers have already taken advantage of this offer. Unless you really want to be benefited by them, please do not apply for them. If you desire to read them, write on postal card to Dr. H. B. Battle, Director, Raleigh, N. C.

Some Late Bulletins of the North Carolina Experiment Station.

The following gives a short description of each of the bulletins issued lately. Each number will be sent free upon application from residents in North Carolina. A small fee (10 cents for 92 and 4 cents for each of the others) is charged those living in other states.

No. 90. Practical Stock Feeding, pages 32. This bulletin gives composition of various feeding stuffs—the nutrients, the nutritive ratios, the digestible portions, tables of feeding standards, the calculation of rations, the full values of fodder and the comparative value of feeds—a valuable bulletin for the practical feeder who desires to understand what he is about.

No. 91. Some Experiments in Wheat Culture; pages 20; cuts 3. Describes the effect of plowing under a crop of ripe cow pea vines for manuring for wheat during a succession of four years on the same ground. The average gain due to this manuring for a series of years per acre was

With no additional fertilizers, 9.68 bu.
With 300 lbs. kainit, 16.46 bu.
With 300 lbs. acid phosphate, 16.81 bu.
With 300 lbs. cotton seed meal, 7.83 bu.
With 175 lbs. acid phos. | 87.5 " cottonseed meal | 37.5 " kainit | 14.67 bu

Seventeen varieties of wheat were also tested, together with the depth of planting. It was found that three inches was the best depth. Best varieties were the following: Winter Green, Tappahannoc, Kivet and Fulcaster.

No. 92. Culture of Orchard and Garden Fruits; pages, 150; 91 cuts illustrate the text. Practical methods for the planting and after treatment of orchards and vineyards; also description of the various insects and fungous pests affecting the growth of trees, vines and small fruits, and methods to destroy them.

No. 93. Feeding Experiments; 46 pages. Includes experiments in fattening stock for beef with cotton seed hulls and meal; feeding with corn silage and soja (soy) bean silage with cotton seed meal; also feeding an exclusive ensilage ration, and a discussion of what is a maintenance ration.

No. 94. Horticultural Tests and Results with Garden Vegetables, Fruits and Bulb Culture; pages 20. Gives tests of cabbages, melons, garden corn, cucumbers, egg plants, lettuce, onions, Irish potatoes, tomatoes, strawberries, raspberries, blackberries, figs, peaches, tube roses, lilies, gladioli, early hyacinths and roses.

No. 95. The Fertilizer Control during 1893; pages 32; includes official analysis of spring and fall samples and a description of ingredients in fertilizers and their analysis. This bulletin describes the materials of which fertilizers are made and their composition; also gives the method for arriving at the valuation of the ingredients by the experiment station, and how to calculate the values per ton reckoned upon the percentages of the three valuable ingredients. Correct freight rates are given to 56 interior points in North Carolina from Wilmington, Norfolk, Charleston and Richmond.

No. 96. Miscellaneous agricultural topics contained in the press service bulletins; pages 32; many practical points of value to the agriculturist are given in plain language. A feature of the bulletin is the collection of the questions and replies upon important farm subjects.

No. 97. Digestion Experiments: pages 48; the results of the detailed work in these pages are described in plain language in a few pages in the beginning, so that a tired man can reach the conclusion at once. For the detailed scientific student and investigator tables are given showing how the above results are reached. The digestion work covers feeding with soy soja) bean hay, cat-tail millet, Johnson grass hay, sorghum fodder and bagasse, peanut vine hay, cotton seed meal, cotton

seed hulls, crimson clover hay, corn meal, cornand cob meal and corn silage.

No. 98. Some Leguminous Crops and Their Economic Value: pages 24. Gives the result of the year 1893, with a great many varieties of clovers, cow peas, soy (soja) beans and other legumines. The bulletin includes discussions of legumines as improvers of the soil, their cultivation for forage and their fungous and insect enemies.

Field Peas.

The North Carolina Experiment Station during 1893 had under competitive test plats of cow peas and soja beans—ten varieties of the former and eight of the latter. The experiment has been completed and the results are published in bulletin No. 98, which is now being mailed in time to benefit farmers who sow these crops in spring. Here it may be said that the "unknown" pea has upon dry, medium and wet soil given by far the best results, out yielding all others, both in fruit and foliage. This pea is also the latest to mature. For second place the contest is between the black pea and the red ripper, both of which are excellent and medium early. The earliest of all is the speckled or whippoorwill pea. The "unknown" in Georgia, sometimes called innominata, and Woods' "wonderful," are in all respects identical—they are one and the same variety.

In the soja bean class, the old yellow variety is the most productive, both in fruit and foliage, but is much later than some of the newer variety.

Concerning the popular names of these plants it may be said that the so-called cow pea is not a pea, but a bean and is more properly called Chinese beans. The so-called soja bean is a true pea, and should be called soy pea, or Japan pea. But by whatever names we call them, these plants are among the most valuable crop the southern farmer can grow.

GERALD MCCARTHY,
Botanist N. C. Experiment Station.

Cabbage Insects.

Probably the worst pest of the cabbage field is the so-called calico or terrapin bug, murgantia histrionica. This pest is practically proof against known insecticides and must be hand picked. This is most easily accomplished by half filling a shallow pan with water, and pouring upon this a ¼-inch layer of kerosene oil. Hold the pan under the plant and shake or jar the plant. The bugs will readily drop into the pan and be instantly killed by the oil. As pure kerosene will burn the leaves badly it must not be splashed on them. The green and striped worms which gnaw the leaves of cabbage may be destroyed by the kerosene emulsion, and the cabbage lice can be held in check by the same remedy.

KEROSENE EMULSION.

Kerosene oil, . . . 1 pint.
Soft soap, ... 1 quart.
Boiling water, . . 2 quarts.

Churn the mixture for ten minutes, until it becomes a thick cream. Then dilute with four quarts of cold water and use. Mixing with a stick will not do, because on cooling the oil will separate and rise to top. When well done the emulsion is stable. Do not dilute until ready to use. Paris green should not be used on cabbage. GERALD MCCARTHY, N. C. Experiment Station.

Advanced Monthly Summary of Meteorological Reports for North Carolina, February, 1894.

The North Carolina state weather service issues the following advanced summary of the weather for February, 1894, as compared with the corresponding month of previous years.

TEMPERATURE.—The mean temperature for the month was 43.8 degrees, which is 0.5 degrees below the normal. The highest monthly mean was 50.9, at Sloan; lowest, 33.6, at Blowing Rock. The highest temperature was 76 on the 10th, at Wilmington; lowest, 2 below zero, on the 27th, at Bakersville. The warmest February during the past twenty-one years was in 1890, mean, 51.6; the coldest in 1875, mean, 38.4.

PRECIPITATION.—Average for the month, 4.82 inch, which is 0.57 above the normal. The greatest amount was 9.64 inches, at Highlands, least amount, 2.60, at Rockingham. The wettest February occurred in 1873—average, 9.03; the driest in 1890; average, 1.41. Snow occurred on the 4th, 5th, 14th, 15th, 16th, 25th, 26th, at some western stations, but on the 25th it was general, and the heaviest snow of the winter occurred. The largest monthly snowfall was 19 inches, at Bakersville.

WIND.—Prevailing direction' southwest. This is the normal direction for February. Average hourly velocity, 10.2 miles. Highest velocity, 48 miles per hour on the 1st at Kitty Hawk.

MISCELLANEOUS.—Sleet or hail occurred at various places on the, 2nd, 22th, 12th, 14th, 19th, 25th, all light. Solar halos occurred on the 10th, 11th, 13th, 17th, 20th, 22d, 23d, 28th. Lunar halos on the 7th, 10th, 11th, 13th, 15th, 18th, 19th. Meteor observed at Rockingham on the 17th.

QUESTIONS AND REPLIES.

The Station will be glad to receive questions on agricultural topics from

any one in North Carolina who may desire to ask for information. Address all questions to the "N. C. Agricultural Experiment Station, Raleigh, N. C." Replies will be written as early as possible by the member of the Station staff most competent to do so, and, when of general interest, they will also appear in these columns. The Station expects, in this way, to enlarge its sphere of usefulness and render immediate assistance to practical farmers.

Cotton Seed Hull Ashes.

Will you kindly inform me whether or not cotton seed hull ashes have ever been analyzed as a fertilizer by the Experiment Station, and what such analysis shows them to contain? F. A. D., Southern Pines, N. C.

[Answered by H. B. Battle, Director N. C. Experiment Station.]

I send herewith pamphlet on the subject of "composts," which gives analysis of cotton seed hull ashes. I would say, however, that analyses of these ashes vary very materially, because in many cases they are more or less burnt and more or less mixed with dirt or outside matters. Exposure to the air may also cause absorption of moisture and decrease of percentage. It is a very high grade potash material, containing a large amount of phosphoric acid as well. I have had an analyses of these ashes, when carefully burned, to run as high as 28 to 30 per cent. potash. The average is probably about 20 per cent.

How to Deal With the Potato Beetle and Cabbage Worms.

1. What shall I use to kill potato beetles?
2. If you advise Paris green with what shall I dilute it? Will ashes do? How put it on? How much Paris green shall I use per acre? Where is the bestplace to get it?
3. Waat is the best remedy for cabbage worms?
4. If kerosene emulsion, where can I get it, and at what cost? How is the emulsion applied?—W. C., Raleigh, N. C.

[Answered by Gerald McCarthy, Entomologist N. C. Experiment Station.]

1. The best remedy for potato beetles is Paris green or London purple, both being arsenites. They are about equally valuable. Mix 1 pound of either with 5 pounds of flour and 60 pounds of dry road dust, air slaked lime or fine ashes. If you have no sprayer apply with a sifter or perforated pan. If you have a sprayer, mix the arsenite in 150 gallons of water and spray it on. In either case repeat the treatment after ten days to kill the insects hatched after the first treatment. Usually these two treatments will suffice, but repeat if necessary.

For cabbage caterpillars, the arsenites are best before the plants have headed. After that hand pick or use a well prepared kerosene emulsion. A badly prepared emulsion will burn the leaves. It is best to buy the concentrated emulsion ready made. It can be bought in five, ten and forty gallon packages of W. S. Powell & Co., Baltimore, about as cheap as you can make it. Always dilute the concentrated emulsion before using with nine times its bulk of cold soft water. Apply with a sprayer, and be sure to wet the bodies of the caterpillars, as this substance kills by contact only. Paris green can be bought of almost any druggist at about 25 cents per pound.

Culture of Pecans.

Would you be so kind as to give me some information in regard to the culture of pecan nut trees, and at what point I can get the sprouts or trees to plant? B. G. G., Thermal City, N. C.

[Answered by W. F. Massey, Horticulturist, N. C. Experiment Station.]

Pecan trees, like all other of the hickory family, are rather hard to transplant with uniform success. We would prefer to get good nuts and plant them where the trees are to grow. Almost any southern nurseryman can supply the seed or trees. P. J. Beckman & Son, Augusta, Ga., are nurserymen of high character, and will doubtless supply you with a good article. We put little confidence in the prospects of great profits from pecan growing on a large scale. It may now pay those well who have bearing trees of the large sorts to sell seed and trees at high prices, but the article is one which the demand for cannot be largely increased, and when the trees now being planted in the south come into bearing, we think the profit problematic. Of course it is desirable for all farmers to have a few pecan trees for ornament and nuts, but we would advise you not to rush too largely into the culture.

Proper Temperature to Churn—Profitable Poultry.

1. What temperature should butter be churned at to attain the best results?
2. Do you consider pure bred poultry, such as Plymouth Rocks and leghorns, much more profitable as flesh producers and layers than the common breed of chickens seen around most farms in this country?

G. F. O., Oakwood, N. C.

[Answered by F. E. Emery, Agriculturist, N. C. Experiment Station.]

1. The temperature at which best results are obtained vary somewhat, first, with the season, being higher in winter than in summer; second, with the kind of foods given the cows, and, third, in different dairies where difference in handling the cream may affect the churning conditions. In winter, where cows are far advanced in lactation and considerable cotton seed or cotton seed meal is fed, as high as 70 degrees, F., or possibly two or three higher may be found desirable. In summer, with fresh cows on good pasture, as close to 60 degrees F. as possible will not be far wrong for the same dairy. Each one must establish its best degree of heat or coolness by actual trials. Too much

care cannot be bestowed on the proper "ripening" of the cream unless you churn more for rich buttermilk than butter.

2. Yes, unless you put a pure Plymouth Rock cockerel at the head of your flock of common fowls and continue to grade up with another from an outside source when the first is gone. The high grade birds will take on the characteristics of the pure bred male in proportion to his purity and prepotent powers. This plan will be easier for anyone who has common birds than breeding pure fowls, and they will have the advantage of (if there is any) the oft repeated claim that the graded stock is more prolific than that bred pure.

Grapes and Blackberries for Market.

Is there money in raising grapes for market? What are best varieties, how to plant, etc? Will it pay to cultivate blackberries? How are they planted and cultivated? How many to the acre? Which is best variety? What the cost of planting?

R. A. R. Vineland, N. C.

[Answered by W. F. Massey, Horticulturist, N. C. Experiment Station.]

Would not advise planting grapes in your soil for market. You would be more troubled with rot probably than on higher and dryer land. The scuppernong for wine purposes is your best grape.

Blackberries will pay well if you are near the railroad and handle them right. Plant them 3x6 feet and tie to stakes and cultivate well, keeping down all suckers except in hill. Best variety is probably Wilson's early. The Early King, Early Harvest and Erin are good, and the Kittatiny is excellent when it does not rust. You can get plants at $8 to $12 per 1,000.

Benefit of Pea Vines to Land.

Kindly let me know what benefit you consider pea vines are to land, as compared with roots, etc., left after vines are cut off. The interest about here is fast awakening to the restoration of old lands (and most all are now more or less so) by pea sowing. The time is near by when we will prepare land for wheat or fall oats, and are not fully together as to the good obtained by leaving the vines to be turned under, some contending that fully as good results can be had in crops that follow, by cutting the vines off for stock food, the roots being worth more than the vine to the land. Do pea vines extract more from the air than any other plant?

C. J. B., Middleburg, N. C.

[Answered by H. B. Battle, Director, N. C. Experiment Station.]

I am glad to know that the subject of planting cow peas is being revived in your section. As a sure renovator of old lands, it is one of the very best crops that can be grown. The cow peas have the same property as clovers and leguminous plants in extracting nitrogen from the atmosphere. This is done through the means of small tubercles on the roots which fix the gaseous nitrogen so that the roots can utilize it. In this way a large amount is retained in the roots, as well as carried to the leaves in organic combination. The plowing under of the whole plant, including vines after they are ripe, is, of course, better than plowing under only the roots, as there is much fertilizing matter in the vines and leaves. The ideal way would be to take off the vines, cure and feed to cattle, and return to the land in manure. The next best way would be to plow under after ripe, so that the fertilizing value of the whole plant is retained in the soil. The proportionate part of the total value in the vines is, of course, dependent upon the growth of the vines, and no fixed ratio can be given. I send bulletin No. 91, which describes experiments with peas preceding wheat. An increase of ten bushels per acre, approximately, has been secured by this method.

Location for Peach Orchard.

I have a plat of land lying on a hollow or ravine, and sloping westward. It is not very steep, but slopes gradually to the bottom of the hollow, which is somewhat level. The lowest part is about twenty feet above the water level in the nearest stream. The land is gray sandy land, and was originally covered with forest pine, but has a young growth of oaks growing on it now. In the spring the oak trees do not put out leaves until the leaves are at least half grown on the ridges all around. I think late frosts in the spring and early frosts in the fall are more severe than on the ridges. Would such a location be a good place to plant late apple trees? Would apple trees be affected by the location the same as the young oak trees? I have a lot of young peach trees seven or eight years old standing near the location I mention, only they are on southern and eastern slopes, and the frost kills the fruit on them every year.

W. C. M., Lincolnton, N. C.

[Answered by W. F. Massey, Horticulturist, N. C. Experiment Station.]

Your peach trees are in the worst place you could put them. In this climate peach trees should never be planted on a southern or eastern slope, but always on a northern or western. On the warm sunny slope they are excited too early and the blossoms nearly always killed. The crest and upper part of the north slope of a nigh ridge are the best places here for peaches. Peaches may do on the upper part of your western slope, and apples ought to do well on the lower part.

Fire Blight of Apple Tree.

I send you specimens of apple twigs from my orchard which were attacked last spring. The disease attacks both branches and twigs. In some cases only the twigs are killed, but in other cases large branches or the whole tree is dead. What is the cause and remedy? I also send diseased or blighted pear twigs. We had a hundred dwarf pear trees, but they are dying off one by one.

J. S. H., Bowman's Bluff, N. C.

[Answered by Gerald McCarthy, Botanist, N. C. Experiment Station.]

The disease on both apple and pear trees is the same—the so-called fire-blight. This is caused by a species of bacteria micrococcus amylovorous. There is no remedy except destruction of affected parts. The disease is very contagious, and the cutting out must be promptly attended to or it will infect the whole orchard. Destroy by fire all dead branches.

THE EXPERIMENT STATION

At Raleigh, N. C., offers to Help the Farmers of North Carolina

APRIL 25, 1894.

The Experiment Station Bulletins.

The standing offer is made to send the bulletins of the Station to all in the State who really desire to receive them. Thousands of farmers have already taken advantage of this offer. Unless you really want to be benefitted by them, please do not apply for them. If you desire to read them, write on postal card to Dr. H. B. Battle, Director, Raleigh, N. C.

Adulterated Cattle Food.

Many people in North Carolina who feed stock, purchase wheat bran. In all the towns where there is no local mill, this bran is purchased by the ton or car load from western mills or wholesale dealers who have taken it from producers. Some of this bran gets to its consumers badly adulterated. Recently out of some bran purchased from a distant place and offered for sale at Raleigh was found the following: Unground kernels of wheat, oats, cockle, chess or cheat and several other varieties of weed seeds to the amount of 10,96 per cent of the whole on the supposition that all was like the sample pound drawn. Some of the light wheat kernels on examination were filled with a dark powder which was probably burnt or stinking smut (Puccinia rubigo-vera) one of the worst pests of wheat growing localities.

The cockle seed (Lychnis githago) was present to fhe amount of 2.77 per cent., or in other words this bran contained 55.4 pounds of cockle seed per ton of bran. Chess, or cheat, (Bromus secalinus) formed 1.01 per cent of the mixture called bran which held 20,2 pounds of chess per ton.

On the Experiment Farm where the stable manure has been weighed it was found that four mature horses with one colt, fourteen cows two bulls, one old steer and three swine produced fifteen tons of stable manure per month. At a moderate estimate for bran 2 1-4 tons would be consumed by this stock per month. Thus the 15 tons of stable manure would be stocked with seed enough to insure a fair stand of weeds. Those who feed this kind of bran should invest in weed killing implements, for they are sure to be needed, not only this year but continually for some time.

There ought to be a penalty for adulteration, especially where the foreign matter may do as much harm as weed seeds are capable of doing. This practice should warn purchasers to be particular to buy by sample and to accept nothing poorer than was shown in sample. It makes an argument for an honest local miller, who if he offers weed seeds will tell you what you are buying and grind them, so you will not be burdened by future weed crops.—F. E. Emery, Agriculturalist N. C. Experiment Station.

A Good Mixture for Tobacco.

Acid phosphate, cotton seed meal, nitrate soda, and sulphate of potash can be mixed to make a high grade fertilizer suitable for yellow tobacco, as follows:

Acid phosphate 13 per cent.	1200	lbs.
Cotton seed meal	575	,,
Nitrate of Soda	100	,,
Sulphate of Potash	125	,,
Total	2000	,,

This mixture will analyze approximately 8.5 per cent of available phosphoric acid, 3.4 per cent. ammonia, and 3.6 per cent. of potash. These ingredients should not cost more than $23.00 for the ton as above mixed, and the mixing can be done at a norminal cost at home. Its value in a great degree depends on careful mixing. The materials should be made fine by mashing and mixed a short while before use. The ammonia is from two sources, cotton seed meal and nitrate of soda, and the latter is of special value for a quick growing plant as tobacco. The potash is in its best form for yellow tobacco as considered by long usage. The advantage of home mixing is that you can alter the proportions to suit your individual needs.—H. B. Battle, Director, N. C. Experiment Station.

Advanced Monthly Summary of Meteorological Reports for North Carolina, March, 1894.

The North Carolina State Weather Service issues the following advanced summary of the weather for March, 1894, as compared with the corresponding month of previous years:

The past winter has been a mild one in North Carolina. The month of January was three degrees above the normal in temperature, and February only half a degree below. The rain-fall was

deficient in January and March, and about half an inch above the normal in February. The conditions were generally favorable for farm work. The weather during March was very unfortunate for agricultural interests. From the 1st to the 26th the temperature averaged twelve degrees per day above the normal, reaching on the 22nd a maximum of 91 degrees at Southern Pines, and 89 at many other places; temperatures so high were never before recorded in North Carolina during March. Vegetation was pushed from two to three weeks in advance of season. The severe freeze of March 27th, and 28th, consequently did enormous damage everywhere. Undoubtedly the peach crop is ruined, but there will be a small yield of other fruits, especially apples. Grapes also were badly damaged, but will grow out again, producing something like half a crop. A good many strawberries were saved by covering, as were also some potatoes in the Eastern District. The loss of truck was very great, but a good deal of planting is done very early, with the expectation of having to replant, which is often done several times a season. Reseeding is well under way, and there is time for good crops. Wheat, oats, rye, tobacco plants and clover were also more or less damaged by the freeze. Notwithstanding all this there are many reasons for encouragement at the beginning of the season of 1894.

TEMPERATURE.—The mean temperature for the month was 54.3 degrees, which is 6.3 degrees above the normal. The highest local monthly mean this month was 59.6 at Wilmington; lowest, 45.2 at Blowing Rock. The highest temperature was 93 degrees, on the 22d at Washington, lowest, 4, on the 27th, at Highlands. This was the warmest March during the past 22 years, the highest monthly mean temperature previously recorded being 54.0 degrees, in 1878. The coldest March occurred in 1872, mean, 43.1,

PRECIPITATION.—Average for the month, 2.05 inches, which is 2.85 inches below the normal. The greatest amount was 4.77 at Falkland; least amount, 0.67 at Marion. The wettest March occurred in 1884, average, 8.50 inches; the driest in 1893, average, 2.15 inches. Very little snow occurred; largest amount, 2.0 inches, at Louisburg.

WIND.—Prevailing direction, South west, which is the normal direction for March. Average hourly velocity, 8,7 miles. Highest velocity, 52 miles an hour from the northwest on the 29th at Hatteras.

MISCELANEOUS.—Thunderstorms occurred at various places on the 9th 11th, 12th, 14th, 15th, 16th, 17th, 18th, 21st. 22nd, 23rd. Light hail, on 7th, 10th, 12th, 14th, 15th, 17th. Snow, 25th, 26th, 29th. Aurora on 30th. Very severe cold wave on the 27th; seriously damaging crops, especially fruit and trucks.

Bulky Portions of a Fertilizer.

The question is often asked. "What are the other ingrediants of a fertilizer not included in the analysis as published and may not the pure materials given in the analysis be purchased alone, and a great saving in freight be effected?

Take for an example a fertilizer with 9.64 per cent available phosphoric acid, 2.39 per cent. ammonia, and 3.05 per cent. potash. These three added together only makes 15.08 out of 100. Of what is the remaining portions, or 84.92 parts? The table below answers this question.

Moisture	16.30	parts per 100
Available phosphoric acid	9.64	" "
Insoluble " "	1.68	" "
Nitrogen (in the ammonia)	1.97	" "
Potash	3.05	" "
Volatile and organic matter	30 00	" "
Sulphate of lime	15 00	" "
Lime (combined with phosphoric acid)	11.00	" "
Silica	3.00	" "
Chemical salts	5.00	" "
Miscellaneous	3.36	" "
Total	100.00	parts per 100

The above represents an Ammoniated Fertilizer. The moistureand organic matter are necessary to accompa'y the material furnishing the nitrogen (or ammonia.) Nitrogen is a gas and must be held in combination, and considerable bulk is necessary, depending on the kind of material used. Lime must be present combined with phosphoric acid, and sulphate of lime is derived from the union of sulphuric acid added to the phosphate of lime to make it more soluble. The chemical salts are generally combined with the potash. The silica is found with the phosphate. An acid phosphate is made up of phosphoric acid combined with lime suphate of lime (the largest constituent) necessarily present as explained above, moisture, and miscellaneous.—H. B. Battle, N. C. Experiment Station.

North Carolina Weekly Weather Crop Bulletin.

The first crop bulletin of the State Weather Service of the N. C. Agricultural Experiment Station, co-operating with the U. S. Weather Bureau, was issued from the central office in Raleigh April 9th. It is mailed on Monday, covering the previous week, to all newspapers of the State in time to reach the papers just going to to press. There are now over 300 correspondents located in every one of the 96 counties, sufficient to give very accurate summaries

of the effect of the weather upon the crops as to rain-fall and temperature, and the general condition of the staple crops, trucking crop, fruit industry, etc, in various sections of the State. To facilitate comparison the State is divided into the eastern district, central, and western. The bulletins will be continued each week during the growing season, ending about October 15, and will be sent free to applicants who after reading them, will agree to post the bulletin in a conspicuous place.

Spraying Orchards and Vineyards.

The general destruction of the fruit crop this year by the March freeze will make fancy prices for those who have been able to save a part of their crops. While the fruit buds of peaches, plums and blackberries are nearly all destroyed, of grapes we may still expect from 1-3 to 1-2 an average crop, and of late apples and European pears a nearly full crop.

Many fruit growers will be discouraged and think it not worth while to fight fungi and insects this year. This is very unwise even where there is no prospect of fruit for the present year. If these pests are allowed to multiply and spread without hindrance this year they may get such a firm foothold in an orchard or vineyard that it may take years to dislodge them. The more tender kinds of trees and vines are more or less enfeebled by the frost and these will be attacked with special virulence by the pests. Unless aid is given by the owner the pests may completely destroy the attacked plants this season. The only safe plan is to start the sprayer as usual and keep it going as long as any signs of noxious insects or fungi appear. Full directions for spraying fruit trees and vines are given in Bulletin 92 of the North Carolina Experiment Station which is sent free to residents of the State and to non-residents who send 10 cents in stamps.—Gerald McCarthy Botanist, N. C. Experiment Station.

Dehorning Cattle or Calves.

This is a humane practice wherever a number of animals are to be kept together. There is always more or less friction between different animals and the stronger are inclined to crowd and hook the weak or fight among themselves for the mastery. Dehorning not only checks this in part, but it prevents personal harm being done to some animals, while it frees the majority from the fear of the master animals in the herd.

We have successfully used the dehorning clipper made by the Leavitt M'f'g Co., Hammond, Ill. This is a safe, rapid method, and for adult animals no one wants a more rapid way of removing horns. No harm results to the animal. We have taken off horns during warm weather and in early winter with uniformly good results. No application after removing the horns in needed, though if in warm weather and there is fear of flies, a little carbolic acid may be sprinkled over the stub and surrounding hair to keep them away by its strong smell.

If it is desired to prevent horns growing in young animals, hair can be clipped from the point where the horn is about to appear, and the horn stopped by the use of a little caustic potash. Take a dry stick of potash and touch to water, then rub on the little protuberance where the horn is coming. Repeat a few times and the horn is killed. It has been known and recommended in bulletins and the public press for some time and belongs to the people if there is any value it. Recently we have been enjoined from using or spreading this information by a company claiming a patent right to sell and make a profit on all caustic potash used for this purpose.

If any of our readers wish to use potash to stop the growth of calves horns they need fear no evil will come to anyone if they buy the chemical from their family druggist, nor that they are infringing on any one else's right any more than to breathe the free air or drink at the roadside spring.—F. E. Emery, Agriculturist, N. C. Experiment Station.

QUESTIONS AND REPLIES.

The Station will be glad to receive questions on agricultural topics from any one in North Carolina who may desire to ask for information. Address all questions to the "N. C. Agricultural Experiment Station, Raleigh, N. C." Replies will be written as early as possible by the member of the Station staff most competent to do so, and, when of general interest, they will also appear in these columns. The Station expects, in this way, to enlarge its sphere of usefulness and render immediate assistance to practical farmers.

Blight of Tomato and Potato.

Can you tell me what is the reason I cannot raise tomatoes and Irish potatoes? The tomato vines flourish until the tomatoes are nearly ready to ripen, then they die. The soil is a rich light loam.

The potato vines flourish until they ought to have potatoes on them, then die. All the vines do not die, but when I dig them there are scarcely any potatoes, and what there are, are small and knotty.—J. F. H., Brinkleyville, N. C.

(Answered by W F. Massey, Horticulturist, N. C. Experiment Station.)

Your plants suffer from the bacterial disease known as "Southern Blight."

which is the great drawback to tomato culture in all Eastern North Carolina. It is the same disease that effects the Irish potato, a near relative of the tomato. It also attacks watermelons to some extent. The first sign of it to an ordinary observer is the sudden wilting of the whole plant, usually after it has developed to a good size. But before it reaches this stage watery spots can be found on leaves and stem, that under the microscope are found to be swarming with bacteria. If one of the wilted plants is cut off you can see with the naked eye that the growing tissue under the epidermis or bark is brown and dead. We will experiment with spraying mixtures to prevent it this season and hope for good results. Tomatoes are more liable to it than Irish potatoes, and potatoes along-side of tomatoes will be affected more than those removed from the tomatoes. It is recommended to spray with Bordeaux mixture from a very young state of the plants in the seed bed until they are in full bloom, about three times. We would advise making the Bordeaux mixture weak, at least for first spray, say 50 gallons of water. For potatoes, spray the potatoes before planting, as soon as up, and again when in bloom. When a tomato plant shows signs of the disease pull it up and burn it at once. Avoid planting where these plants grew the year before.

Cultivation of Cranberries.

I have an acre or more of marshy land almost entirely and continually covered with water. Soil entirely vegetable; yielding willow, bottom bush, wild rose, water grass, etc., is on the north side of a hill and subject to freshet over flow. Will the cranberry likely thrive on such soil and situation at this altitude? If so, should I plant berries or plants? When? What distance apart? What depth if berries? What cultivation? General management of plants, etc.?—A. L. B. Stophel, N. C.

(Answered by W. F. Massey, Horticulturist, N. C. Experiment Station.)

No experiments that we know of have been made in this latitude in the artificial culture of cranberries. They are indigenous to the high valleys of our northwestern counties, but their success in the lower part of the state is problematic. The preparation of a bog for cranberry culture is an expensive matter, more so in fact than for rice culture. The land must be thoroughly ditched so as to drain, and must be at the same time diked, so that it can be overflowed artificially, when needed, and protected from overflow at all other times. All bushes and all the grass sod must be cut off and removed, and the surface covered with sand. Cuttings of the vines, made by running them through a feed cutter, are planted in drills and kept well cleaned from all wild growth until they cover the land after which they take care of themselves, excepts as to overflowing and draining. Orange Judd Co., LaFayette Place, New York City, publish a book on cranberry culture.

Fire Blight of Apple Tree.

I send you specimens of apple twigs from my orchard which were attacked last spring. The disease attacks both branches and twigs. In some cases only the twigs are killed, but in other cases large branches or the whole tree is dead. What is the cause and remedy? I also send diseased or blighted pear twigs. We had a hundred dwarf pear tress, but they are dying off one by one.—J. S. H., Bowman's Bluff, N. C.

(Answered by Gerald McCarthy, Botanist, N. C. Experiment Station.)

The disease on both apple and pear trees is the same—the so-called fire blight. This is caused by a species of bacteria, micrococcus amylovorous. There is no remedy except destruction of affected parts. The disease is very contagious, and the cutting out must be promptly attended to or it will infect the whole orchard. Destroy by fire all dead branches.

Nitrate of Soda for Strawberries.

I would like to get a little information from the Experiment Station, concerning Nitrate of Soda on strawberries used as a top-dressing.

First. When is the proper time for application?

Second. Should it be applied in wet weather, or when the plants are dry?

Third. Is there any danger of killing or burning the plants with it?

Fourth. About how much to the acre?—J. C. J. Rocky Point, N. C.

(Answered by W. F. Massey, Horticulturist, N. C. Experiment Station.)

First apply the Nitrate 1-2 at two dressings—first as soon as growth begins; second when fruit is setting.

Second. Always apply in dry weather when the foliage is dry, never in wet weather.

Third. If the leaves are wet with rain or dew it will burn them if applied directly. Best plan is to scatter it on both sides of the row. It dissolves at once on the soil.

Fourth. Use 100 lbs., per acre, 1-2 at a time, as suggested.

Injury to Acid Phosphate by Marl.

Please inform me by return mail whether Marl will injure acid phosphate or not, if composted together? Will the lime in the marl destroy the acid in the phosphate and leave the phosphoric acid insoluble as though it had not been treated with acid or not?—J. C. M. Resaca, N. C.

(Answered by H. B. Battle, Director, N. C. Experiment Station.)

Marl will have a tendency to injure Acid Phosphate. By its contrat with the soluble Phosphoric Acid in the latter, it will have a tendency to change it to the reverted Phosphoric Acid and finally to the insoluble, which are not so useful as the soluble form. I prefer, therefore, not to mix the two materials.

THE EXPERIMENT STATION

At Raleigh, N. C., Presents Some Matters of Interest.

Crimson Clover a Valuable Plant—A Fraud Exposed.

MAY 25, 1894.

The Experiment Station Bulletins.

The standing offer is made to send the bulletins of the Station to all in the State who really desire to receive them. Thousands of farmers have already taken advantage of this offer. Unless you really want to be benefited by them, please do not apply for them. If you desire to read them, write on postal card to Dr. H. B. Battle, Director, Raleigh, N. C.

Crimson Clover for Hay or Seed.

Crimson clover (trifolium incarnatum) is known under a variety of common names—Annual, German, Scarlet, and Italian. This clover is easily grown, and should come into quite general use. It is an annual, and consequently must be re-seeded for each crop, which makes it important to grow seed at home. Seed may be sown from July to October, but the land should always be well prepared for it, or, if not, it should be well shaded, as under a growth of cow-pea vines, or in a corn or cotton crop, where the seed should be sown when the crop is laid by. Grown in this way it may be of great service in enriching and holding the land from washing. Its growth is made in the cool, wet part of the year, and it is ready to be made into hay at a season when planters are waiting for cotton to vegetate for first working. This is often a dry time, and the hay can be quickly and easily cured. It may often be best to sow this clover with oats, rye, or barley, and cut all for hay in April or May.

This clover will thrive on land in moderate condition, but, like some other forage plants; will pay best where given a rich soil. The composition of crimson clover hay shows it to be a highly nutritious food. It is so rich that for any use it may well be fed with some such fodder as straw, meadow hay, or cotton seed hulls. When fed for production of milk, the addition of corn, or corn and oats, will tend to add to the good qualities of the product.

The seed distributed in 1893 by the N. C. Experiment Station is part of a crop of 2,687 pounds from 1 3-8 acres, which is at the rate of 1,956 pounds of seed in chaff per acre. We have made some tests on this, which if true for the whole lot of seed, would yield at the rate of 757.95 pounds, or 12 5-8 bushels per acre of clean seed. This seed usually sells at retail for ten cents per pound, and dealers are now paying $5.50 per bushel for it, The long, well-filled heads warrant this a good cash crop where a good stand can be secured on land in fair condition. It can be grown in orchards for the improvement of the soil, as in Delaware, where it has come to be a standard crop. The one drawback is that a special machine must be used to clean the seed. A clover seed huller is expensive, but could clean the seed of a whole township, and perhaps a whole county by moving around as is usual with threshing machines.

There are several advantages in growing annual clover sufficient to induce its cultivation from purchased seed; but if, instead of buying seed, it can be grown at a profit and add one more to to the cash crops, how much better to take such steps as will insure its general planting.

In maturing a crop of seed care should be exercised to pull out weeds and foreign plants and so keep the seed clean. Let the clover get ripe, but not so as to shell out too freely before cutting, and handle as little as possible. Pitch up into cocks from the swath and draw in from the cocks in tight wagons. If tough, the cocks may be turned over from the bottom a half hour before drawing to shelter. House on a tight floor and thresh out at the first opportunity after the straw has dried out enough to thresh well.—F. E. Emery, Agriculturist, N. C. Experiment Station.

Crimson Clover Seed Distributed in 1893.

The Experiment Station having on hand last year (in 1893) Crimson clover seed which had been grown on the experiment farm, offered through the press of the state to distribute to applicants who would pay transportation charges and who would make careful trial of same, enough seed to plant 1-3 acre. There were 1586 persons who applied for the seed, far more than the Station could supply, unfortunately. Indeed a quantity of seed had to be purchased to send as many as was supplied. The first 426 names received

were sent the seed. To others full explanation was given as well as at what points the seed could be procured. Replies regarding the test are now coming in and tend to show that widespread information has been given in regard to this most valuable forage crop. and much interest has been created in its cultivation.

Experiences With Crimson Clover.

Just now the Experiment Station is receiving a lot of varied but interesting information in relation to growing this plant from the farmers to whom seed was distributed last year. Brief directions for every step in growth of the crop were sent with the seed and the call for this information contains specific inquiries as to the various processes which help in studying the effect of preparation of soil in different sections of the state.

That the crop has been found all the Station claimed for it so far by some farmers is shown in the following report from Vance county:

"Grown on stiff red land in very good condition. Broken with two horse plow and harrowed with a Gayle harrow. Harrowed the seed in with same implement October 4th, or 5th, '93. The amount of seed used was 3 pounds cleaned, and it was put on 1-3 of an acre. No fertilizer was used except a dressing of tobacco stems after the clover came up. The clover started well, and continued to grow off well until injured by the March freeze. It has not been grazed but is now being fed green on the soiling system. I think it a splendid feed and will sow several acres this fall if I can get the seed. Think it would be better sown in August or September. I send herewith a specimen which I think is about an average stalk as it is very uniform and very thick."

The specimen was 26 inches long; the head 2 inches. 1-3 of the piece or 1-9 acre like it should produce seed enough for 5 or 10 acres, or enough if clean, to bring $10.—F. E. Emery, Agriculturist N. C. Experiment Station.

Another Fraud Exposed.

This time it is a seed fraud. The Station last month reported the serious adulteration of bran with cockle, cheat and other weed seed, and the inevitable result of feeding the bran, by which a clean field would rapidly become seeded with these obnoxious weeds, wherever the manure was put on the land.

A correspondent from Robeson county sends a seed package which reads as follows:

LATE CABBAGE.

Recommended by U. S. Agricultural Department as the best cabbage for the Southern States. Grown and warranted by the Junaluska Seed Co., Junaluska, N. C. Price, ten cents.

Our correspondent writes. "Sometime in the early part of this spring, an unknown man passed through this part of the state selling garden seed, and sold quantities of them throughout the county, but they have proven to be spurious and of no value to those who purchased them. Inclosed you will find one of the papers, also one of the plants. Can you tell us what it is? Thinking or believing that it was all right none of us asked the man his name, and have no redress. The plant sent by him was apparently the European wild cabbage used often to adulterate cabbage seed. A communication was at once sent to a reputable seed house in western North Carolina, and a reply was promptly received saying, "We hope you can help us run the rascals down. We have heard nothing from them this season, but last year we had many complaints from the eastern part of the State, and a friend sent us a seed bag. It was printed Cabbage Seed, grown by the Reems' Creek Seed Garden Co. We investigated the matter and found the parties had lived near Asheville N. C., but could not get their names to publish them. We think the Junaluska concern the same parties that swindled the people last year."

The rascals are smart because they do not give their names, and the post offices Junaluska, N. C., and Reem's Creek, N. C. are purely fictitious. for there are not now, and never have been post offices by those names.

The penitentiary is the best place for them. All persons are warned not to buy from such parties, and in fact let travelling seedsmen alone for there are enough reliable well established dealers in the business who cannot afford to misrepresent knowingly anything they sell. They count their reputation of far more value.—H. B. Battle, Director N. C. Experiment Station.

Advanced Monthly Summary of Meteorological Reports for North Carolina, April. 1894.

The North Carolina State Weather Service issues the following advanced summary of the weather for April, 1894, as compared with the corresponding month of previous years:

TEMPERATURE.—The mean temperature for the month was 57.3 degrees, which is 0.4 degrees below the normal. The highest monthly mean was 61.6 at Southern Pines; lowest monthly mean, 45.5 at Blowing Rock. The highest

temperature was 89 on the 28th, at Washington; lowest, 22 on the 7th, at Bakersville. The warmest April during the past twenty-one years occurred in 1886, mean 60.8; the coldest was in 1881, mean 53.9.

PRECIPITATION.—Average for the month, 1.75 inches, which is 2.09 inches below the normal. The greatest amount was 3.13 at Bryson City; least amount 0.65 at Sloan. The wettest April occurred in 1874, average 7.96 inches; the driest, in 1888; average 1.74 inches.

WIND.—Prevailing direction southwest, which is the normal direction for April. Average velocity, 9.8 miles per hour. Highest velocity, 46 miles per hour from southeast, on 10th, at Kitty Hawk.

MISCELLANEOUS.—Thunderstorms occurred at various places on the 1st, 4th, 10th, 17th, 18th, 19th, 20th, 21st, 23rd, 26th, 27th, 28th, 29th. Light hail on 19th, 20th, 23rd, Frosts occurred on 2nd 3rd, 6th, 7th, 10th, 11th, 12th, 13th, 14th 16th.

The month was unusually dry.

Distribution of Soy (Soja) Beans.

The N. C. Agricultural Experiment Station at Raleigh, desiring to extend the cultivation of Soy Beans has proposed to distribute a quantity of seed to careful planters desiring to test their merits. The only condition is that each applicant send 10 cents in postage stamps to pay cost of transportation by mail. Enough seed will be sent to each applicant to plant 1-10 acre. The first 400 applications will be filled in the order received.

The Station regards this as a very valuable forage plant. It is of upright growth 2 to 3 feet high and is a leguminе capable of adding nitrogen from the air to the soil in which it grows. It is planted in hills or drills 2 1-2 to 3 1-2 feet apart according to richness of soil, and 15 to 24 inches apart in the row. It can be planted any time from March to July, either alone or in the corn row between the corn, and 2 to 4 beans are usually planted in each hill. Soil suitable to it and the general preparation is the same as for corn. When planted for corn both crops can be ensilaged together, and the corn ensilage will be much improved by the combination, or the plants when planted alone can be cut for forage before they get too woody. The seed are found in small pods and can be saved by cutting the whole plant when leaves and pods have turned a golden hue. They can easily be beaten out when dry. If cutting is delayed beyond this time the pods will open and some will be lost on the ground. It will not pay to pick the beans. It is also a good table bean, but requires a long time to cook. The beans parched similar to coffee, has been used as an acceptable substitute, for it, and at far less cost. It has not the exact aroma of coffee, but is recommended as a cheap substitute probably just as good and in some cases better than the low grades of coffee after being adulterated with peas or beans with a value less than the soy bean. The Station urges a careful trial of this crop.

Directions for Cooking Soy Beans or Peas.

The following directions have been tried by Dr. J. H. Mills, of the Baptist Orphanage at Thomasville, N. C., and recommended by him:

Soak the peas until the skins come off, then stir the peas until the skins rise to the surface and skim them off. Boil the peas with bacon until soft. Add pepper and butter to suit, and serve hot. If the peas are green, the preliminary soaking may be omitted. This makes a most palatable dish, well liked by the children.

Chicken Cholera and Its Prevention.

Why submit to heavy losses from this disease? Up to April, 1894, this disease had not been on the Experiment Farm to our knowledge. Early in that month a hen became sick and dumpish with dark comb; all food and water refused. It was thought useless to treat this case, but Epsom salts were administered and this was followed with copious watering put in the mouth with a spoon. The hen was placed in a warm, sunny place, isolated from usual runs, and recovered very slowly.

Another hen died in a few days and then another and a cockerel, and several persons who had had experience with cholera pronounced this disease to be cholera. The hen and cockerel died near night, and next morning two other hens were dead and eight more were in different stages of the disease.

Treatment was begun at once. Two hens were killed and buried as those previously dead had been. The six were brought out into the sunlight and given salts and water.

The house and yard were thoroughly disinfected with 1 pint of strong sulphuric acid to 8 gallons of water, as suggested in poultry books. The hens themselves were sprayed with this. Their drinking water was charged with carbolic acid (1 teaspoonful to half gallon water) and asafœtida was put in their food at the rate of 1 heaping tablespoon to the food of 30 chickens.

The next morning six hens could not get off the roost, though all but two had gone up as usual the night previous, after their treatment. These were treated as before and put outside the yard. Before night all but four

hens were walking about pecking grass. After three days of isolation these four were returned to the yard cured, and all have been in good health since. Six hens and a cockerel were lost before the health of the flock was restored by the treatment as given above.

Had we known the disease at first, it is doubtful if a single bird need to have been lost. Promptness to disinfect and treat the sick birds will save many losses. The doses of salts, not before recommended to my knowledge, doubtless helped rid the birds of the cholera bacilli sooner than if it had not been given, and so hastened the eradication of the disease. The asafœtida acts as a diffusible stimulant to help keep the birds warm.

The drinking water was for some days kept charged with carbolic acid, and all that is now needed to secure immunity from another attack is a second thorough disinfection and to continue for some time the addition of carbolic acid to the drinking water. F. E. Emery, Agriculturist, N. C. Experiment Station.

Questions and Replies.

The Station will be glad to receive questions on agricultural topics from any one in North Carolina who may desire to ask for information. Address all questions to the "N. C. Agricultural Experiment Station, Raleigh, N. C." Replies will be written as early as possible by the member of the Station staff most competent to do so, and, when of general interest, they will also appear in these columns. The Station expects in this way to enlarge its sphere of usefulness and render immediate assistance to practical farmers.

Cultivation of Barley.

Please send me any information you can in regard to growing barley; the time and manner of seeding, etc. G. W. E.—Wilson, N. C.

(Answered by F. E. Emery, Agriculturist, N. C. Experiment Station.)

Barley flourishes best in a moist, cool climate. Its short straw and stiff beards are against its introduction in places where it might be cultivated. However, there are beardless varieties, and they can be sown on rich land, which will force it to a maximum growth. Sown in August, it will, if not checked by drouth, produce a good late forage, which will continue growing after early frosts have checked other vegetation. Cut when heading out or soon after, before beards are hard; this makes a good green food, or hay, but will be slow to cure if cut late. The land should be well prepared and rich to grow a good crop of barley, as this, like the other small grains, is a gross feeder, and must have food at hand. Sow one to one and a half bushels per acre, or, where a thick stand for forage is required, two bushels may not be too much. The fertilizer should be a previous crop of clover, cowpea vines or other legume, or a complete chemical manure, with a rather high percentage of nitrogen if on poor land. For a grain crop, winter or the earliest possible spring sowing would seem preferable, hence from December to February would be about the right time to give this crop a natural development and have the grain ripen normally and when it can be easily harvested.

Cucumbers for Pickles.

"I write to ask some information for growing and packing cucumbers for pickles for the fall and winter market.

I would like to know the best kinds of cucumbers to plant for making pickles of small size to pack in barrels and kegs and the best kinds for making very small pickles to pack in glass. Also which is best, to plant in hills or drills and distance of same. Also the full process of packing the cucumbers in barrels, kegs and glass and kind of vinegar to be used and any other information that may be at your command.—J. S. S. Salem, N. C.

(Answered by W. F. Massey, Horticulturist, N. C., Experiment Station.

"Cucumbers for pickling are generally grown by gardeners as a second crop after some early crop has been harvested. The seed are planted late in July in well manured hills four and one-half to five feet each way, and cultivated like cantaloupes. They should be cut when the length of ones finger, or even smaller for bottling pickles. Cucumbers should always be cut, never pulled, so as to have a portion of the stem attached. The vines should not be handled when wet with dew. If not shipped at once, or sold to a pickling factory, they should be dropped in strong brine and kept under the brine until ready to pickle. Long green and white spine are the sorts commonly grown. We prefer the long green or Nichol's medium green For process of pickling we will have to refer you to the cook books.

Shells and Lime.

"Please state the difference between shell and other lime. Are shells reduced to lime by burning?—W. H. L. Princeton, N. C.

(Answered by H. B. Battle, Director, N. C. Experiment Station.)

Shell lime is merely shells burned. Rock lime or stone lime is the crude limestone after it has been burnt. The combination in all the crude materials is carbonate of lime, which by the action of heat is changed to the oxide of lime, or caustic lime; building lime is also the caustic lime. Marl contains refuse of shells and consequently has a varying percentage of carbonate of lime.

THE EXPERIMENT STATION

At Raleigh, N. C., Describes Some of Its Work.

A Few Late Bulletins, Ever Bearing Mulberries—Some New Forage Plants—Questions and Replies,

June 1894.

The Experiment Station Bulletins.

The standing offer is made to send the bulletins of the station to all in the state who really desire to receive them. Thousands of farmers have already taken advantage of this offer. Unless you really want to be benefitted by them, please do not apply for them. If you desire to read them, write on postal card to Dr. H. B. Battle, Director, Raleigh, N. C.

Ever Bearing Mulberries.

The botany of the mulberries is much mixed. They all belong to the genus morus, except the tree known as the Otaheite or paper mulberry, which is a Broussonettia. This tree is seldom found fruiting here as the vast majority of those grown on the staminate or male trees—morus multicaulis. the Chinese silk worm mulberry—caused a great excitement in this country fifty years or more ago, with a great craze over silk culture. From this species Charles Downing raised the variety known as Downing's ever-bearing, which produces a large and very good fruit, but as it lacks hardiness in the north is now grown only in the south. There are three classes of mulberries, the white, black and red, but they sport greatly, for white mulberries frequently give black fruit. A species from Russia, the Tartarian mulberry, is largely used for hedging in the northwest. There have been many varieties raised from the foreign species, besides that of Mr. Downing—and several from our native red mulberry. The most promising of these native sorts is the Hick's ever-bearing. This variety was first introduced by Mr. Rose of Macon, Georgia, as a tree for furnishing cheap and abundant hog food in summer. It is a very profuse and continuous bearer for three to four months, and is as valuable for chickens as for hogs.

It is stated that the Stubbs mulberry, which was sent to Mr. Berckmans, the nurseryman of Augusta, Ga., by Colonel John M. Stubbs, of Dublin, Ga., is the most prolific of all, even exceeding the Hicks. It produces fruit jet black and fully two inches long, and is very good table fruit. Mulberries are easily grown in the south from ripe cuttings a foot long set in the ground full length in the fall. An orchard of the Hick's or the Stubbs will be found a profitable adjunct to every southern farm providing succulent food for hogs and poultry until the pea fields are ready—or the sweet potatoes are grown.—W. F. Massey, Horticulturist, N. C. Experiment Station.

Three Forage Plants For Sandy Soil.

Among the plants suitable for very dry sandy soils, the three best forage plants are Spurry (spurgula arvensis) Seradella (ornithopus sativus,) and Sulla, (Hedysarum coronarium.)

Spurry, belongs to the pink family, which includes besides the garden pinks the very common weeds, chick weed, mouse ear and sandwort. From an economic standpoint, this family is far from promising and Spurry is the only genus which has been found of use as a forage plant. Animals refuse this until they get used to it, and then seem to like it. The plant is highly valued for sheep and cow pastures on the sandy heath lands of Holland and Belgium. It is thought to give a superior flavor to butter and to the flesh of sheep. Spurry has been tested on a large scale on the pine barrens of northern Michigan and is very highly recommended for that section. It has been tried in a small way in some of the southern states, but with no great success. If it has any value for the Carolinas it will be for the long leaf pine district. For good average land some of the legumines will give better satisfaction. Spurry may be sown broadcast, using about 6 pounds of seed per acre, any time from March 1st, to September 1st. The plant grows about 12 inches high and is very prolific in seeds. Spurry seed posesses great vitality, and the plants usually break ground 3 days after sowing the seed. The subsequent growth is rapid and the plants may be pastured in 6 weeks or mown for hay 8 weeks after sowing the seed. This plant seeds so heavily and the seed has such great vitality it is liable to become a more troublesome weed than chick weed in cultivated ground. It should

not be used except on land too poor to produce a better crop.

SERADELLA is a member of the great and eminently useful pulse family—including the clovers, peas, beans etc. Like all the members of this family, Seradella is able to draw upon the free nitrogen of the atmosphere and hence for green manuring is superior to Spurry. This plant is a native of Portugal and is there highly esteemed as a forage crop for sandy soils. Seradella is an annual, grows about 24 inches high, seeds fairly well and the herbage is easily cured for hay, and well liked by stock. Seed may be sown broadcast about April 1st, using 20 lbs per acre. The growth is much slower than that of Spurry, and only one crop can be grown in a year.

SULLA, (Hedysarum coronarium) is also a legumine and is a native of Spain. The uses and value of this plant are much the same as Seradella but it is somewhat inferior to the latter.

All three plants above described can be recommended only for very poor sandy lands or where no fertilizer can be afforded. When the land will bring a good crop of cow peas, or soy peas these latter are the better plants to grow either for forage or green manure.—GERALD MCCARTHY, N. C. Experiment Station.

Recent Bulletins of the N. C. Experiment Station, at Raleigh N. C.

The following bulletins recently issued by the N. C. Experiment Station will prove of interest to farmers. They will be sent free to those applying for same in North Carolina; to others a small charge of 4 cents each will be made. Apply to the director, Dr. H. B. Battle, at Raleigh, N. C., for them

BULLETIN 96. Miscellaneous Agricultural Topics, contained in the press bulletins. 32 pages. A popular bulletin containing a variety of articles contributed by the Station to the press, during the last half of the year 1893. All of these subjects are treated in a popular way, and in untechnical language as far as possible. About 80 farm questions are so considered.

BULLETIN 97. Digestion Experiments. 48 pages. In order to arrive at the true value of many of our common feeding stuffs, so they can be more economically and rationally fed, these actual digestion experiments have been conducted. Animals are fed with the different foods and rations, the amount of food eaten and water drank being carefully recorded, the amount of excrementitious matters are also ascertained and analyzed and compared with the analysis of the food eaten. The difference in the two affords means for estimating the quantity of materials actually digested and utilized by the animal. Preliminary pages are given describing in detail the digestibility of foods, and digestion experiments, the terms used, the animals employed for the test, and the different rations employed. A summary of results is next given for popular understanding. These portions of the bulletin occupy 16 pages; the remaining 32 pages relate to the details of the work and are not sent except where especially desired. The foods experimented with are soy (soja) bean hay, cat-tail millet, Johnson grass hay, sorghum fodder, peanut vine hay, sorghum bagasse, (residue after juice is extracted from cane,) bagasse and cotton seed meal, one year old crimson clover hay, same hay with cotton seed meal, cotton seed hulls and meal, with large proportions of meal, corn silage and cotton seed meal, corn meal, crimson clover hay and corn meal, corn and cob meal, crimson clover hay and corn and cob meal.

BULLETIN 98. Some Leguminous Crops and their Economic Value. 40 pages. These crops have especial value because they take out that valuable gas from the atmosphere (nitrogen) and store it up in their roots to be utilized in their growth, and for future crops on the same soil. When we buy nitrogen in a fertilizer it costs us about 18 cents a pound and it is needed by nearly all crops. These crops get this material for nothing. All good farmers should therefore be sure to utilize these natural benefactors, for they are of great value to mankind. The clovers, cow peas, and soy bean are the best of these crops. Chapters are devoted to legumines as improvers of the soil, the cultivation of leguminous plants for forage, and the fungous and insect enemies of legumines. The crops tested included, lucerne, hybrid medic or sand lucerne, black medic, sulla, seradella, kidney vetch, japan clover, soft tick seed or beggar weed, yellow lupine, common vetch, woolly vetch, hairy vetchling, improved flat pea, false vetch, goober pea, giant white clover, red clover, mammoth clover, zig-zag clover, crimson clover, Southern cow pea (10 varieties). Japanese pea (3 varieties) and Japanese bean (2 varieties). The best of the cow peas are in the order named, the "unknown" or "wonderful" (the same variety,) the black, the red ripper, the whippoorwill, and the conch.

BULLETIN 99. Thread Worm of Pork, 8 pages. A popular account of this worm or Trichina spiralis, showing its various life stages, and how they become dangerous to human life. All eaters of

pork should understand the danger and how it can be averted, which is easily done by cooking well all parts of the meat to at least a temperature of 175 degrees, F. Pork is seldom affected in this way, which is fortunate, but we ought to adopt measures to prevent the worm from getting into our system, even when we are unconscious of its existence in the pork we eat.

BULLETIN 100. Our Common Insects. 36 pages. A bulletin to describe the scientific classification of insects, so that school children may become acquainted with the various insects and know how to distinguish between noxious and beneficial insects. If the children's interest is aroused, the interest of their parents is at the same time secured.

A New Potato Pest.

Several complaints have reached the station from Columbus county concerning the ravages of a hitherto unnoticed insect upon growing Irish potatoes. Mr. A. B. Smith, of Armour, N. C., writes: "Thousands of these bugs have suddenly appeared on my potatoes, there being an average of three or four to each plant. They do not eat the leaves but puncture the growing tip causing the plant to wither and soon die. What is it and what shall I do for it?" Mr. J. B. Chadbourne of the same county sends specimens and writes in much the same strain.

The insect is Leptoglossus phyllopus a true bug closely related to the predaceous Thick-thighed Soldier bug-Acanthocepholis femorata. This insect is not common in this state and has been considered beneficial because it feeds upon thistles and occasionally attacks the terrapin bug of the cabbage. In Florida it attacks the orange: Now that it has changed its diet from thistles to potatoes, it is likely to become a troublesome pest.

REMEDIES.—As this bug does not gnaw the foliage it can not be poisoned by arsenites. The only remedies are the kerosene emulsion and hand-picking. The latter will prove upon the whole most satisfactory. Use shallow pans containing some water and film of pure kerosene. Hold the pan under the vines and jar or shake the bugs into it. The best time to do this is before sun rise in the morning while the insects are still torpid.—GERALD MCCARTHY, Entomologist, N. C. Experiment Station.

Questions and Replies.

The station will be glad to receive questions on agricultural topics from any one in North Carolina who may desire to ask for information. Address all questions to the "N. C. Agricultural Experiment station, Raleigh, N. C. Replies will be written as early as possible by the member of the station staff most competent to do so, and when of general interest, they will also appear in these columns. The station expects in this way to enlarge its sphere of usefulness and render immediate assistance to practical farmers.

Raising Cabbage for Market—Onions.

Do you think I could make it pay raising cabbage for the markets of Danville, Richmond, etc.? (I mean, could I get them early enough from this section?) Do early onions pay any better than late ones? Is the Prize-Taker onion any better for the old way of culture than Yellow Danvers? C. S. W.—North Wilkesboro, N. C.

(Answered by W. F. Massey, Horticulturist, N. C. Experiment Station.)

I doubt that you would find profit in growing early cabbage for the Richmond or Danville markets in your section as the eastern part of the state gets them so much earlier. But it will pay on the rich bottom lands of the Yadkin to grow late fall and winter cabbage for Raleigh and the southern market. Early onions, bunched, grown in March pay better than ripe ones. The first ripe ones in the market bring better prices than later in the season when the onions from the north and west come in. The Prize-taker onion is larger than Danver's Yellow. If you mean by the "old way" to grow them from sets, you will find little difference in them; but it is entirely needless to go to the expense of sets to raise a crop of onions, as by early sowing you can grow as good, or better, a crop from seed the same season. Sets are only useful for fall planting to raise early grown onions for bunching.

Remedies for Borer of Peachtree.

Will wrapping the base of a peachtree in tarred paper keep the borer out?—W. M., Speight's Bridge, N. C.

Answered by General McCarthy Entomologist, N. C. Experiment Station.

Wrapping the base of trunk will prevent the female borer moth from laying her eggs on the collar of the tree if the paper is wrapped sufficiently tight to keep the insect from crawling down between paper and bark. This is difficult to do, and therefore the treatment is not reliable. Mounding, or use of washes recommended in Bulletin 92 of this station, are much more satisfactory.

Grass For Permanent Pasture.

I have some muck, or meadow lands that I desire to convert into permanent pasture. Will you please inform me what variety of grass will be most suitable for swine and cattle, when to seed, how long before stock should be turned on after seeding?—J. F. H., Godsboro, N. C.

Answered by F. E. Emery Agriculturist, N. C. Experiment Station.

1. For permanent pasture, Kentucky blue, red top, with white clover and Bermuda grass is the best possible combination. Use as much as one and a half bushels per acre of the first two, three to five pounds of clover and one bushel of Bermuda grass seed, or cuttings of the stems raked from gardens can be used. Cut them in any feed cutter, and sow broadcast and harrow in. Eight or ten bushels of cut stems will not be too much to sow per acre. 2. If the land is dry enough plow and sow to cow peas. Turn down the pea vines as soon as they are ripe and sow the seed; rye may be sown, too, if desired and this will shorten the time to turning on stock. If land is in good condition it could be sown without the aid of the pea vines in dog days,—with the assurance of a good stand of plants. 3. Stock may be turned on only after the plants have made growth enough to well cover the ground and the turf is firm enough to support the animals without much injury. Too early grazing will work a permanent injury to the pasture. Better wait till the rye begins to head unless the growth is very luxuriant.

Nitrate of Soda and Ashes.

Would there be any loss of ammonia in mixing nitrate of soda with unleached hard wood ashes to use as a top-dressing for strawberries. I wish to give the nitrate more bulk and the ashes are sooty. The ammonia in the nitrate being in a non-gaseous form I take it that the same harm would not follow as from mixing ashes with stable manure.—O. W. B. Kittrell, N. C.

Answered by H. B. Battle, Director, N. C. Experiment Station.

The addition of ashes to nitrate of soda will not be objectionable. I assume that you will wish to apply just after mixing. There might be some change if the mixture is allowed to stand over some time.

Crimson Clover, Timothy, Bermuda Grass.

I am anxious to sow some grasses and clover on my farm in Bertie county this fall and write for some information. When is the best time to sow crimson clover, and how much per acre ought to be planted? Can any grass seed be sowed with it that will mature at the same time? If so, what kind? What kind of guano is best to apply and how much per acre for best development of this crop? Is it best to put the fertilizer under, or as a top dressing? I have a piece of deep soil thickly set in Bermuda grass that I wish to sow, will it interfere with the growth of the other grasses, or clover? When ought Timothy to be sowed and how much per acre? What kind of grass seed or clover is best to sow with it?—J. H. E., Littleton, N. C.

Answered by F. E. Emery, Agriculturist, N. C. Experiment Station.

On moist loam or sandy land any time in September is considered the right time to sow crimson clover. Here on dry land it must be sown early enough to get the benefit of the moist weather which is ushered in by dog days. In general whenever the next two or three weeks can be counted on for plenty of moisture and shade. Twelve to fifteen pounds of clean seed or thirty to forty pounds of seed in chaff is enough to use per acre if well distributed, as this crop stools heavily when it has a good chance. Sow on the surface or cover very lightly. Few grasses can mature with crimson clover. Common rye, or even Italian rye grass may be sown with crimson clover when the design is to cut for green food or hay. These can about keep pace with the clover. We would use one half bushel of rye or one bushel Italian rye grass per acre with eight to twelve pounds of the clover seed.

Clover finds its own nitrogen by extraction from the atmosphere aided by peculiar microbes of the soil hence only phosphates and potash, or lime to set these free in the soil would be needed. The needs of the particular soil should be consulted as to the element it lacks which is needed to produce a bountiful crop of clover. Hence trials of potash, phosphate and the two combined would be in order wherever it is desirable to use chemicals for this crop. Amounts should be varied, too, as what would be a profitable amount for one field or farm might prove too little or too much for those adjoining. We would broadcast before or after the harrow at seeding or use as a top dressing a little later.

Bermuda grass will smother out some of the grasses but the soil bearing it will probably be your best place for Timothy. For ordinary sowing, orchard grass is hardy and a rank grower and will beat Timothy, but it gets woody if not cut early and has not so good a reputation for hay, although properly handled it is equally as good or better and of the same character. It is one to three weeks earlier than Timothy. Sow two bushels per acre, and with it two bushels Kentucky blue grass and six pounds common red clover. Of Timothy eight to ten pounds of seed with six to eight pounds of pea vine clover would be fair seeding on the Bermuda grass soil. Where the Bermuda is absent we would add four or five pounds of white clover seed, or two bushels of meadow foxtail, to furnish aftermath to protect the Timothy bulbs from the sun, otherwise it would be in danger of destruction after first mowing. It would be well to grow a crop of pea vines this summer to plow in for the grass seeding. Plow deep, turning the vines well under when nearly or quite all ripe; harrow to a seed bed without disturbing the vines and sow the seed then whether August or as late as November.

TABLE OF CONTENTS.

MISCELLANEOUS AGRICULTURAL TOPICS.

	PAGE.
List of officers	238
Preface	239
No distribution of plants, seeds, etc	240
The Experiment Station bulletins	240
Formulas for composts and home-made mixtures for cotton and corn	240
Soy Beans ought to be planted	240
Lathyrus sylvestris or flat pea	241
Advanced meteorological summary for North Carolina, December, 1893	241
Cold waves	242
Analyses of fertilizers	242
Satsuma orange trees	243
Keeping nitrate of soda	243
Clover and grass for loamy land, peanuts, chufas	243
The cultivation of onions and Irish potatoes	243
The Experiment Station bulletins	244
Some late bulletins of the N. C. Experiment Station	244
Field peas	245
Cabbage insects	245
Advanced monthly summary of meteorological reports for N. C., February, 1894	245
Cotton seed hull ashes	246
How to deal with the potato beetle and cabbage worms	246
Culture of pecans	246
Proper temperature to churn, profitable poultry	246
Grapes and blackberries for market	247
Benefit of pea vines to land	247
Location for peach orchard	247
Fire blight of apple tree	247
The Experiment Station bulletins	248
Adulterated cattle foods	248
A good mixture for tobacco	248
Advanced monthly summary of meteorological reports for N. C., March, 1894	248
Bulky portions of a fertilizer	249
North Carolina Weather Crop Bulletin	249
Spraying orchards and vineyards	250
Dehorning cattle or calves	250
Blight of tomato and potato	250
Cultivation of cranberries	251
Nitrate of soda for strawberries	251
Injury to acid phosphate by marl	251
Crimson clover for hay or seed	252
Crimson clover seed distributed in 1893	252
Experiences with crimson clover	253
Another fraud exposed	253
Advanced monthly summary of meteorological reports for N. C., April, 1894	253
Distribution of soy beans	254
Directions for cooking soy beans	254
Chicken cholera and its prevention	254
Cultivation of barley	255
Cucumbers for pickles	255
Shells and lime	255
Ever-bearing mulberries	256
Three forage plants for sandy soil	256
Recent bulletins of the N. C. Experiment Station, at Raleigh, N. C.	257
A new potato pest	258
Raising cabbage for market—onions	258
Remedy for borer of peach tree	258
Grass for permanent pasture	258
Nitrate of soda and ashes	259
Crimson clover, timothy, and Bermuda grass	259